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Essays on Decision-Making in Buyer-Supplier Exchanges in Normal and Disrupted Modes

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I am submitting herewith a dissertation written by Li Cheng entitled "Essays on Decision-Making in Buyer-Supplier Exchanges in Normal and Disrupted Modes." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

Christopher Craighead, Major Professor

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Essays on Decision-Making in Buyer-Supplier Exchanges in Normal and Disrupted Modes

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ABSTRACT

While extant studies mainly focus on the performance implications of strategies deployed in buyer-supplier exchanges, there remain unanswered questions relative to decision-making aspects of these exchanges. As the exchanges occur in various contexts (the focal firm, dyad, and supply chain), decision-making processes can be shaped by structural, relational, behavioral and environmental factors—calling for a contingent view. Furthermore, firms do not always operate in a steady, normal mode; rather, they often deal with supply chain disruptions. While the normal mode characterizes the organizing of routinized, planned activities, the disrupted mode features uncertainty and unexpectedness. Given the distinct nature of the two modes, decision-making behaviors can vary. This dissertation thus serves as an inquiry into decision-making in buyer-supplier exchanges in either a normal mode of operation (Essay 3) or a disrupted mode (Essay 1 and Essay 2), via examining cognitions, perceptions, and behaviors contingent on boundary factors.

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INTRODUCTION

A supply chain is a network of firms that transform raw materials into distributed products (Bowersox, Closs, & Stank, 1999; Hult, Ketchen, & Slater, 2004); hence, interfirm exchanges between a buyer and a supplier have become a major focus of supply chain research. While prior studies have mainly focused on the performance implications of strategies deployed in buyer-supplier exchanges, questions about decision-making aspects of these exchanges remain unanswered. In addition, buyer-supplier exchanges occur in various contexts (the focal firm, dyad, and supply chain); therefore, structural, relational, behavioral, and environmental factors further shape decision-making processes. Such a contingent view is critical because strategic choices are made depending on the surroundings (Child, 1972). Furthermore, supply chain firms do not always operate in a steady, normal mode; instead, they often deal with supply chain disruptions—unplanned delays or stoppages of planned product flow (Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007). While the normal mode of operation characterizes the organizing of routinized, planned activities, the disrupted mode features unexpectedness and uncertainty (Craighead et al., 2007). Given the distinct nature of the two modes, decision-making behaviors can vary. In summary, this dissertation serves as an inquiry into decision-making in buyer-supplier exchanges by examining cognitions, perceptions, and behaviors. Three essays incorporate one or more boundary conditions further shaping decision-making in either a normal mode of operation (Essay 3) or a disrupted mode (Essays 1 and 2).

Essay 1 (Chapter I) investigates buyers' decisions about the continuity of their relationships with suppliers in the wake of supply chain disruptions. While it may be expected that buyers would act on the supply chain relationships following a disruption, anecdotal evidence has been mixed. Recent studies, notwithstanding insights about what firms do about their focal organization, have not addressed what firms do about their relationships following a disruption and the processes leading to their actions/inactions. As firms continually scan and make sense of the world (Daft & Weick, 1984), we identify buyers' attributional, sensemaking process following disruptions as leading to their decisions about the relationship continuity. We then identify suppliers' recovery actions (in the form of justice actions) as moderators shaping the impact of buyers' attributions. Thus, we integrate attribution theory and justice theory and design a vignette-based study using managers to flesh out the mechanisms driving buyers' relationship decisions in a disrupted mode (see Figure 1 for an overview).

Essay 2 (Chapter II) examines *when* suppliers' messages in the form of justice recovery are well received by buyers in the presence of supplier-induced disruptions While research shows that the absence of suppliers' recovery almost always leads to a deteriorated relationship, it is less clear if—or more likely *when*—the presence of suppliers' recovery efforts guarantees a restored relationship. This study focuses on boundary conditions of a specific set of recovery actions (i.e., suppliers' justice actions): disruption severity and buyers' supply chain uncertainty. Through the lens of signaling theory (Connelly, Certo, Ireland, & Reutzel, 2011a; Spence, 1973), we frame supplier-induced disruptions as negative signals from suppliers (signalers) to buyers (receivers), followed by suppliers' justice actions as positive signals. We develop rival hypotheses of whether the negative signal's strength (disruption severity) and uncertainty in the signaling environment

(supply chain uncertainty) heighten or dampen positive signals' effectiveness. In addition, we explore whether some signals are more effective than others, given the type of negative signal (disruptions due to quantity shortage, delays, or poor quality). Using the critical incident technique to capture two disruption events from 302 Chinese buyers (i.e., 604 observations), we test the boundary conditions shaping the effectiveness of suppliers' recovery actions in a disrupted mode (see Figure 2 for an overview).

Essay 3 (Chapter III) investigates focal firms' power-related behaviors in multimarket buyer-supplier negotiations (negotiations as a routine activity of buyer-supplier exchanges). We identify two voids in the power literature. First, prior literature has often focused on (or assumed) exchanges between focal firms occurring in a single market. Yet, in many cases companies have exchanges with their partners across multiple markets. We recognize that exchanges conducted by the buyer and the supplier in different markets may interfere with each other; hence, the insights obtained based on single-market exchanges may not be extrapolated to the case of multiple markets. Second, prior literature has often assumed that firms' possession of power advantages (in the form of less dependence on the focal partner) leads to exploitation of power and thus favorable outcomes (e.g., a larger profit share from the exchange). Predicated on this assumption, studies have mainly focused on conditions facilitating power use. However, there can be conditions under which firms are held back from using power—hence power *non-use* (Crook, Craighead, & Autry, 2017). This essay aims to identify exogeneous conditions inherent to the multimarket context (i.e., organization, market, and resource) and test how these conditions jointly shape power non-use. The three conditions are *exchange diffusion* (organization), *spheres of influence* (market), and *mutual dependence* (resource). Modeling the negotiation as a variation of the alternate offer game (Binmore, Shared, & Sutton, 1989; Rubinstein, 1982) and via the lens of resource dependence theory (Emerson, 1962; Pfeffer & Salancik, 1978), we operationalize (a) one firm's power advantage over the other derived from having a larger outside option of the focal contracts than its partner, (b) low/high exchange diffusion as the focal firms' centralized/decentralized structure to manage the exchanges, (c) broad/narrow spheres of influence as the varying range of the power-advantaged firm's dominance over its partner across markets, and (d) mutual dependence as the differential between the contracts' surplus and the sum of the outside options. We conduct an economics-based experiment and identify two scenarios leading to power non-use in the multimarket negotiations (see Figure 3 for an overview).

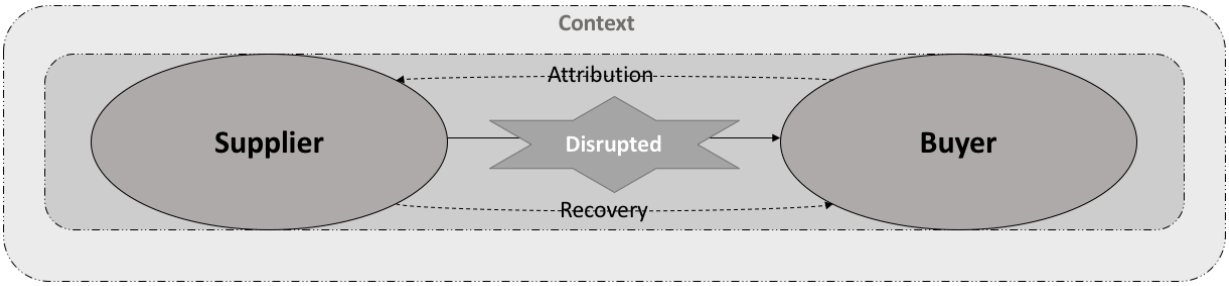


Figure 1: An Overview of Essay 1

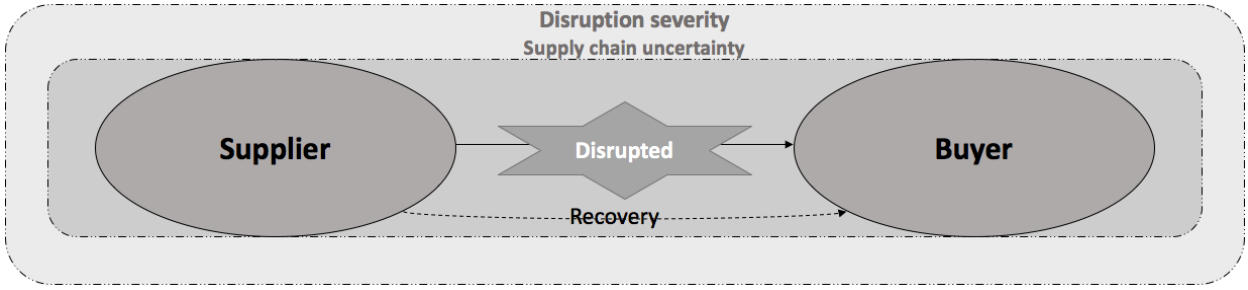


Figure 2: An Overview of Essay 2

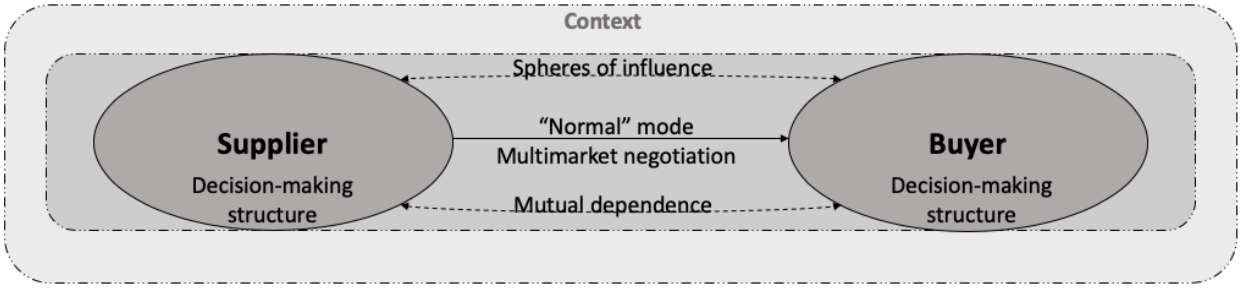


Figure 3: An Overview of Essay 3

CHAPTER I
THE ROLE OF CAUSAL ATTRIBUTION IN SUPPLY CHAIN DISRUPTIONS

ABSTRACT

Firms increasingly wield supply chains to enhance performance, while inevitably facing supply chain disruptions. Little is known about the cognitive processes that drive firms' actions/inactions regarding their on-going relationships with involved suppliers when disruptions occur. We view disruptions as one type of relationship violation. Using a behavioral lens to examine buyers' actions about relationship continuity, we incorporate (1) the attributional processes of buyers in the presence of disruptions—their sensemaking of why violations occur—and (2) the justice actions of involved suppliers in the resolution process—their correction of wrongdoings. Using a vignette-based study with 2028 US managers, we find that buyers' attributions regarding disruptions (a function of the disruption cause's locus of causality, stability, and controllability) have both an immediate and a persistent impact on relationship continuity. Such impact's nature (linear/curvilinear, positive/negative) depends on the locus of causality. Notably, buyers' attribution enhances continuity when the locus is external. Relatedly, whether and how suppliers' justice actions shape the impact of buyers' attributions on continuity depends on the locus of causality. When the locus is internal, justice cannot shape the attributions' impact. When the locus is external, justice suppresses the attributions' positive impact and these suppliers shoulder more blame via justice actions.

INTRODUCTION

Scholars have long stated the strategic relevancy of firms' task environments (cf. Bourgeois, 1980; Duncan, 1972)—the surroundings that firms continually navigate for opportunities, scan for threats (Bourgeois, 1980; Daft & Weick, 1984; Jackson & Dutton, 1988), and act (or do not act) on (Dutton & Jackson, 1987; Thomas, Clark, & Gioia, 1993). Such an environment is a supply chain—a network of firms that transform raw materials into distributed products (Bowersox et al., 1999; Hult et al., 2004). Within supply chains, firms increasingly seek valuable inputs (e.g., products, service, expertise) from suppliers to perform critical tasks (Ketchen & Hult, 2007) and purposefully build on-going relationships to gain a competitive edge (Hult, Ketchen, & Arrfelt, 2007; Hult, Ketchen, & Nichols, 2002). However, this environment as characterized by its interlinked nature (Ketchen, Crook, & Craighead, 2014) poses increasing threats as unexpected incidents lead to supply chain disruptions[1]—unplanned delays or stoppages of planned product flow (Craighead et al., 2007). Such disruptions can have severe repercussions on a firm's share price (World_Economic_Forum, 2013) and result in abnormal returns (Hendricks & Singhal, 2005b), particularly in this rapidly changing and intensely competitive economy (Fiksel, 2017; World_Economic_Forum, 2013).

Intuitively, disruptions trigger what firms do about their supply chains, such as rethinking and redesigning their relationships with involved suppliers. Yet, anecdotal evidence remains mixed about firms' actions/inactions regarding the relationships. Toyota, for instance, maintained its relationships with suppliers who had interrupted its inbound product flows because of a severe earthquake (Greimel, 2016). Likewise, Lululemon continued working with a supplier who had delivered under-qualified fabrics and thus created a snafu for the company (Larcker, Larcker, & Tayan, 2014). In contrast, Lumber Liquidators terminated its relationship with suppliers who had

[1] We use the terms *supply chain disruptions* and *disruptions* interchangeably throughout this paper.

provided toxic products and thus disrupted the company's production (Ferrari, 2015). Therefore, scholarly understanding of what drives firms' actions/inactions about supply chains when disruptions occur is needed. Yet, research has been lacking on this front, despite insights on disruptions' antecedents (Bourgeois, 1981; Hendricks, Singhal, & Zhang, 2009; Roberts, 1990; Weick & Roberts, 1993) and consequences (Hendricks & Singhal, 2003a, 2005b; Jacobs & Singhal, 2017; Meyer, Brooks, & Goes, 1990; Morgeson, Mitchell, & Liu, 2015; Wan & Yiu, 2009).

To address this research gap, we take the following stances. First, a firm is an open system that scans and makes sense of the environment and responds to its sensemaking (Daft & Weick, 1984; Scott & Davis, 2015; Thomas et al., 1993). Second, a supply chain disruption is a type of relationship violation that involves a victim (buyer) and a violator (supplier) trying to correct wrongdoings in a relationship (Bode, Wagner, Petersen, & Ellram, 2011). As unexpected events such as disruptions interrupt the regular progression of work, buyers can first switch from routine to mindful cognitive processing (Patriotta & Gruber, 2015)—searching for causes of the violation and making attributions about the causes (Eckerd, Hill, Boyer, Donohue, & Ward, 2013)—and then respond to those attributions. At the same time, as suppliers take justice actions to correct the violation (Kim, Dirks, Cooper, & Ferrin, 2006; McColl-Kennedy & Sparks, 2003), buyers who continually scan the environment receive additional information (Tomlinson & Mayer, 2009) and modify their actions accordingly. We use Weiner's (1986) causal attribution theory as a framework that predicts how buyers' sensemaking (i.e., attributional processes triggered by disruptions) subsequently shapes buyers' actions about the continuity of relationships with involved suppliers. Furthermore, we complement that theory with justice theory, which explains how involved suppliers' justice actions (procedural, distributive, and interactional) further modify the impact of buyers' attributions on relationship continuity.

We conduct a vignette-based study with 2028 US business managers and show that (1) the continuity of buyers' relationships with suppliers is a function of the responsibility attributed to suppliers upon disruptions and suppliers' justice actions in the resolution process and that (2) the attributed responsibility is also a function of attributional dimensions—locus of causality, stability and controllability. Thus, we unpack the black box that explains why buyers act in a certain manner when disruptions occur, while providing guidance for involved suppliers about how to handle the relationship crisis. There are several notable implications. First, while attribution literature suggests that attributions to suppliers will damage the relationship in the wake of disruptions (Hartmann & Moeller, 2014), we have found that damage only occurs when disruptions are caused internally by suppliers. In the presence of disruptions caused by *force majeure*, a high or low level of buyers' attributions has little damage on continuity. Instead, when ambiguity exists in how much blame should be placed on suppliers (i.e., buyers' blame is neither extremely high nor low), uncertainty is added to buyers' appraisals and disturbs continuity the most. Similarly, while we expect the impact of buyers' attributions on continuity to endure through suppliers' justice, we have found this only for internally-induced disruptions. When disruptions are externally induced, buyers' attributions have *a positive,* lingering impact on continuity. This observation reinforces the important role of buyers' attributional processes in shaping a disrupted relationship; and based on the locus of causality, buyers' blame can be a liability or an asset. Furthermore, while inter-organization literature seems to paint a rosy picture of justice (e.g., Colquitt & Rodell, 2011; Luo,

2007b; Ren & Gray, 2009), we suggest caveats. When disruptions are externally caused, three justice actions weaken the *positive* impact of buyers' attribution; and the suppliers will shoulder more blame through justice actions. The good news is that justice actions' net effects on continuity remain positive. Finally, while previous studies have suggested a complementary interaction between locus of causality and controllability in shaping attributions (Folkes, 1984; Vaidyanathan & Aggarwal, 2003), we have found a substitutive interaction.

THEORY AND HYPOTHESES

Prior studies have taken economic or structural perspectives (Bode & Wagner, 2015; Morgeson et al., 2015; Perrow, 2011) to examine disruptions' impact on firms, thus imposing a mechanistic view of firms as though they merely react to the environment (Child, 1972). However, firms continually make sense of events (e.g., disruptions) and act on the environment (e.g., supply chains) (Daft & Weick, 1984; Scott & Davis, 2015; Thomas et al., 1993). Such a cognitive perspective is pivotal as it unveils mechanisms accounting for firms' actions/inactions in response to disruptions. We propose that firms' actions about the continuity of relationships with their suppliers can be a function of two components: (1) the responsibility attributed to suppliers and (2) suppliers' actions to resolve disruptions. Our theoretical framework is presented in Figure A-1.1. All figures and tables are presented in the Appendix 1 of Chapter I.

Integrating Causal Attribution Theory and Justice Theory

To investigate the first component—how buyers' attributions in the wake of disruptions affect their relationships with suppliers and how these attributions are formed, we turn to causal attribution theory (Weiner, 1986, 2000). The basic processes of attribution have been studied extensively in social psychology (Kelley, 1967; Kelly, 1971) and organization behavior including motivation (Klein, 1989; Thomas & Velthouse, 1990), leadership (Dienesch & Liden, 1986; Meindl & Ehrlich, 1987), conflicts (Bowling & Beehr, 2006; Greenhaus & Beutell, 1985), communication (Bowen & Ostroff, 2004), and impression management (Wayne & Liden, 1995). Tomlinson and Mayer (2009) applied Weiner's attribution theory to inter-organizational settings to address one instance of relationship violation—trust damage. Our context—a supply chain disruption—is likewise a relationship violation that involves a victim (buyer) and a violator (supplier) who tries to correct wrongdoings in a relationship (Bode et al., 2011).

One key tenet of attribution theory is that firms' attributional processes can explain and predict the firms' subsequent actions. Firms act as information processors, frequently trying to make sense of the world around them by searching for and making attributions about the causes of events. Characterized by threat, uncertainty, and unexpectedness (Craighead et al., 2007; Kleindorfer & Saad, 2005), the context of supply chain disruptions is particularly favorable to such attributional processes (Weiner, 1985; Wong & Weiner, 1981). We propose that buyers unpleasantly perceive disconfirming evidence when disruptions occur. This perception prompts them to identify the causes of the event (Weiner, 1986) subsequently shaping their actions regarding the relationship.

Another rationale behind attributional processes is that firms may form different attributions in response to similar outcomes depending on the causal inferences made regarding those outcomes (Daft & Weick, 1984; Weiner, 1986); those attributions are formed along three dimensions—locus of causality, stability and controllability. For example, in the face of

performance downturns, firms' decision makers can make distinct attributions to factors that vary in the three dimensions and, thus, respond differently (Ford, 1985b). Therefore, we expect that buyers, in the wake of disruptions, can hold suppliers accountable to varying degrees based on their causal inferences along the three dimensions.

Also suggested is that attributions' initial impact on actions can be shaped by subsequent social accounts and substantive actions as firms continually search for updated information (Tomlinson & Mayer, 2009; Weiner, 1985). Thus, we incorporate insights from justice theory (Bies, 1986; Greenberg, 1990b; Leventhal, 1980b) and frame suppliers' justice actions as one type of these substantive actions. Justice theory suggests three actions—procedural, interactional, and distributive justice—that produce positive, relationship effects including improved trust (Colquitt & Rodell, 2011), commitment (Korsgaard, Schweiger, & Sapienza, 1995) and alliance performance (Luo, 2007b), resolution of relationship conflicts (Ren & Gray, 2009), and repair of damaged trust when disruptions occur (Wang, Craighead, & Li, 2014). We propose that suppliers can take justice actions to modify the impact of buyers' attributions on continuity.

Furthermore, justice studies indicate that justice's effectiveness in correcting wrongdoings can depend on the negative events' specificities. For instance, Smith, Bolton and Wagner (1999) show that justice efforts in response to a service failure need to match the failure type to restore customer satisfaction. Relatedly, attribution theorists suggest that the modifying impact of substantive actions (i.e., justice actions) on attributions depends on the events' attributional dimensions (e.g., Tomlinson & Mayer, 2009). Along this line, we expect that the effectiveness of suppliers' justice levers varies depending on a disruption's locus of causality.

Causal Attributions of Supply Chain Disruptions

Supply chain disruptions are triggered by events occurring at the focal firm's supply base or during the firm's inbound logistics process. Such events include supplier's quality issues, delayed shipments, and plant accidents (Bode et al., 2011). Notably, these events do not always disrupt the focal firm's product flows. Rather, a disruption results from a triggering event *and* the supplier's actions/inactions. For instance, if a supplier misses its schedule to produce required components (an event) but purchases components from other sources (supplier's action), the focal firm will not experience disruptions. Similarly, if a tsunami hits a supplier's seaport (an event) but the supplier manages to obtain materials from alternative sources (supplier's action), disruptions will not occur. In these two examples, however, the focal firm would have disruptions if the supplier does not act or acts inappropriately. This distinction between a disruption and its triggering event is key to our theorizing as we focus on attributions of a disruption (as opposed to its triggering event).

When a disruption occurs, firms retrospectively link it to possible causes through a causal search (Ford, 1985b; Weick, 1979). Sensemaking begins with such questions as "Why was delivery delayed?" and "Why did product quality decline?" The answers to such questions constitute causal attributions. Following Weiner (1986), we propose that each cause can be categorized along three dimensions: (a) *locus of causality*—the extent to which causes are a function of internal (i.e., caused by supplier) or external (i.e., caused by nature) determinants; (b) *stability*—the degree to which causes are perceived to either fluctuate or remain constant; and (c) *controllability*—the degree of volitional control suppliers have over the outcomes. These

dimensions collectively form buyers' attributions about disruptions. Figure A-1.2 describes buyers' attributional processes.

Locus of causality. Locus of causality reflects buyers' perceptions that a cause of a supply chain disruption resides in the environment (an external attribution) or in suppliers (an internal attribution). This dimension is appraised based on the triggering event. External attributions include environmental shocks, competitors'/governments' actions, and disruptive technologies. Internal attributions include suppliers' strategy, quality control, production, experience, and workforce skills (Bettman & Weitz, 1983; Ford, 1985b). In the wake of disruptions, locus of causality "tells" buyers the source triggering the disruption and to whom to attribute responsibility.

Attribution theory predicts that if the incident is triggered by an external factor, the victim tends to blame that external factor rather than the violator (Folkes, 1984) and holds the violator less liable for the negative outcome (Lepine & Van Dyne, 2001); otherwise, the victim blames the violator. For instance, in a consumer-retail-supplier context, individual consumers attribute significantly more responsibility to retailers and suppliers if the incident's cause was company failure, rather than *force majeure* (Hartmann & Moeller, 2014). In the context of supply chain disruptions, we argue that buyers attribute more responsibility to suppliers if the disruption is triggered by factors internal to suppliers as opposed to external factors. Suppose a tsunami hits a supplier's plant and disrupts buyers' production. In this case, buyers would perceive the *root cause* of the supplier's failure to deliver as some *force majeure*, not within the supplier's organization; i.e., without the tsunami, the disruption would not have happened. Thus, buyers could attribute more responsibility for such a disruption to external factors than to the supplier (Weiner, 1986, 1995). In fact, buyers might even perceive the supplier as a victim of the event (*force majeure*), rather than a violator, and thus tend not to blame the supplier. In contrast, if the buyers' production is disrupted due to the supplier's internal events (e.g., insufficient capacity), buyers would perceive the root cause as man-made within the supplier's organization and see the supplier as being responsible for the incident, which then caused the disruption. Therefore, with internally-induced (versus externally-induced) disruptions, buyers are more likely to associate a supplier with the negative event and attribute more responsibility. Hence,

Hypothesis 1. Buyers attribute more (less) responsibility of disruption to suppliers when the locus of causality is internal (external).

Degree of stability. Stability reflects buyers' perceptions that the cause of a supply chain disruption is on a continuum ranging from temporary to permanent (Ford, 1985b), i.e. to what degree the cause is perceived to fluctuate or remain constant. If a disruption has occurred regularly in the past (e.g., a supplier has consistently delivered late), it would be attributed to a set of stable causes (e.g., a supplier's lack of reliability or capability). In contrast, if a disruption has occurred infrequently (e.g., a supplier that has been always on time but is late once), it would be attributed to unstable causes (e.g., suppliers' one-time negligence of monitoring traffic). In other words, whether the cause of disruptions is stable can be implied by whether similar disruptions occur frequently. Note that we focus on the frequency of disruptions as opposed to triggering events.

Assessment of stability could shape buyers' expectation of (1) how much their suppliers should learn from repetitive events and (2) how likely disruptions will recur (Ford, 1985b). First, when similar disruptions occur frequently (instead of parsimoniously), buyers would expect that their suppliers may have learned to handle, and even build up resilience against, the repetitive disruptions. Thus, the focal disruption indicates that suppliers have not learned from their repeated mistakes (Shimizu, 1999). Otherwise, they would have dealt with them. In this case, buyers' attribution may not be driven solely by the focal disruption, but also by suppliers' repeated wrongdoings. For instance, if a supplier of an electronic vehicle manufacturer continually fails to deliver because of its provider's material shortages (e.g., scarce metals), the manufacturer will expect this supplier to have established mechanisms (e.g., alternative access to the metal) to deal with such shortages. If the supplier fails to deliver again for the same reason, the manufacturer can be upset about the supplier's repeated failures and blame the supplier for not only the focal delivery delay but also the past ones. In contrast, if this supplier rarely misses its delivery but happens to fail the focal one, the manufacturer will only blame the supplier for the one-time event.

Second, as a stable cause indicates a higher chance of similar disruptions in the future (Ford, 1985b; Weiner, 2000), buyers may expect the cause to have a long-run impact (Tomlinson & Mayer, 2009). Thus, the levels of buyers' attribution may reflect not only the focal disruption, but also expectations of future disruptions. For instance, when a supplier frequently fails to deliver due to hurricanes at its seaport, buyers can attribute this failure to the supplier's bad sourcing strategy (e.g., seaport choice) and can expect similar disruptions in the future, given the strategy's long-run nature. In this case, buyers' blame can be driven by not only the focal disruption but also the uncertainty that this supplier brings into the buyers' supply chains. In contrast, when a supplier cannot deliver one time due to a hurricane (regardless of whether hurricanes are frequent at the seaport), buyers would possibly attribute this disruption to the supplier's negligence in monitoring weather, and their blame would only center on the focal event. Hence,

Hypothesis 2. Buyers attribute more (less) responsibility of disruption to suppliers when the occurrences of such disruptions are more (less) frequent.

Buyers blame suppliers even more for frequent disruptions when supply chain disruptions are perceived to be caused by internal factors (i.e., untenable suppliers' behaviors) rather than by *force majeure*. In other words, the effects of stable causes accountable for disruptions are magnified when such causes are also believed to be internal rather than external. When disruptions are caused by internal factors within a supplier's organization as opposed to external factors, buyers expect a flatter learning curve for the supplier to implement procedures and develop solutions in the face of repetitive disruptions. Consider again the example involving the electronic vehicle manufacturer. If the disruption is due to the supplier's lack of production capacity (internal) rather than the raw materials' scarcity (external), the manufacturer would expect it to be easier for the supplier to escalate its own production as opposed to finding alternative sources for scarce metals. When the supplier fails to deal with its capacity issue and lets such internally-induced delays occur, the manufacturer's blame for the repetitive delays is magnified. Hence,

Hypothesis 3. The positive relationship between the frequent occurrences of supply chain disruptions and buyer-attributed suppliers' responsibility of supply chain disruptions is stronger (weaker) when the locus of causality is internal(external).

Controllability. Controllability reflects buyers' perceptions that a cause of a supply chain disruption is due to suppliers' ability to directly influence situations (Ford, 1985b; Weiner, 1986). A key note is that our theorizing of controllability is based on the disruption's cause rather than the triggering event. Regardless of whether the disruption is triggered by internal or external factors, its controllability can be perceived either way. Hence, locus and controllability are independent dimensions (Tomlinson & Mayer, 2009; Weiner, 1995). For instance, a disruption was caused by the supplier's man-made scheduling mistake (i.e., internal locus). If the supplier could have afforded a training program for workers to reduce such mistakes but chose not to, this cause was controllable. However, if the supplier did not have resource to provide such training, this cause was uncontrollable. Another example is a disruption due to a hurricane hitting the supplier's seaport used to import materials (i.e., external locus). If the supplier could have obtained materials from other seaports but chose not to, the cause was controllable. If the supplier did not have alternative access to these materials, the cause was uncontrollable. The significance of controllability relates to suppliers' intentions.

Firms seek control and mastery over their environments (Aldrich & Pfeffer, 1976). When firms relinquish control, others might perceive this relinquishment as deliberate (Anand & Stern, 1985). When suppliers are perceived to have control over the causes leading to supply chain disruptions, yet fail to use such options to prevent negative outcomes, buyers are more likely to wonder why and possibly question suppliers' intentions of losing control. For example, a supplier delivered defective components due to its aged production line; therefore, the buyer's assembly was disrupted. Furthermore, the supplier had slack resources to purchase a new line but did not. The buyer would perceive the supplier's losing control as intentional, and even as a sign of lacking integrity or commitment (Eckerd & Handley, 2015); hence, greater responsibility would be attributed to the supplier. In contrast to controllable causes, uncontrollable ones would merely lead to less negative perceptions or even to forgiving the negative incidents without the active blame (Weiner, 2000). In the above scenario, if the supplier had an aged production line because it could not afford to upgrade, the buyer would likely perceive the incident as unintentional and blame the supplier less. In contrast, in the hurricane example, when the supplier could have obtained imports from another seaport but did not, the buyer would be suspicious of the supplier's intent and commitment, and thus blame the supplier more (Kelley, 1973). On the other hand, if the supplier had no alternative access, it would be perceived as less culpable and less blameworthy (Lewicki & Bunker, 1996; Tomlinson & Mayer, 2009). Hence,

Hypothesis 4. Buyers attribute more (less) responsibility to suppliers when the controllability of the cause of supply chain disruptions is high (low).

When the causes of disruptions are under suppliers' control and are perceived as internal instead of external factors, buyers attribute more responsibility to suppliers. Ford (1985b) argues that the level of arousal provoking firms to make sense of a negative event is a direct function of not only initial expectation of control, but also the event's implication for other aspects of the firms

(Ford, 1985b). As argued previously, suppliers who are better able to influence the disruption but let it occur anyway are blamed more because their lack of control is perceived as intentional. In this case, if the disruption's source was also internal, buyers could be more prone to wonder if suppliers' unfavorable intentions might spill over to other aspects of the focal exchange. In the example of internal locus, when the supplier failed to produce qualified components because it chose not to upgrade its production line (as opposed to being subject to some uncontrollable constraints), the buyer would speculate that the supplier might slack in other commitments (e.g., training, quality control, etc.) and thus blame the supplier more. In contrast, if a hurricane hit the supplier's seaport and the supplier chose not to search for alternative seaports (despite being able to), the buyers' perceived spillover effect would be less compared to the internal-locus case because the buyer would be less certain whether the supplier's choice was due to its bad intent or to the challenges and expense of finding seaports (e.g., seaports have no extra capacity, switching fees are too high, etc.). Furthermore, the buyer may perceive the supplier as victim to the hurricane and be empathetic regarding the supplier's choice (Lepine & Van Dyne, 2001). Hence,

Hypothesis 5. The positive relationship between the controllability of the cause of supply chain disruptions and buyer-attributed suppliers' responsibility of supply chain disruptions is stronger (weaker) when the locus of causality is internal (external).

Responses to Causal Attribution of Supply Chain Disruptions

Attribution theory contends that how one party perceives the cause of disruptive events and attributes the blame has enormous consequences for actions (Kelley, 1973; Moore, 2000; Weiner, 1986). Specifically, a buyer's attribution about the cause of a supply chain disruption (relationship violation) forms the basis for the buyer's decision about the discontinuity/continuity of that relationship. Continuity—i.e., willingness to continue a relationship—is at the core of a supply chain's quality (Nyaga, Whipple, & Lynch, 2010). It is linked to favorable relationship outcomes such as future collaboration (Bercovitz, Jap, & Nickerson, 2006), lower negotiation costs (Artz & Brush, 2000), less opportunism (Jap & Anderson, 2003), and stronger ties (Heide & Miner, 1992).

Continuity is partly fostered by a proactive sensemaking process, searching for meaning as a way to deal with uncertainty (Weick, Sutcliffe, & Obstfeld, 2005). In other words, buyers tend to pursue on-going relationships with suppliers if the relationships do not involve high uncertainty of violations (i.e., unpredictable negative events such as disruptions) in the future. When buyers attribute more responsibility to suppliers for the violation, the buyers are likely to associate suppliers with uncertainty and perceive future interactions with them as risky. In this case, buyers leave the focal relationship to escape potential damages in the future. In addition, buyers' willingness to continue the relationship (i.e., shadow of the future) is influenced by buyers' prior history of interactions with suppliers (i.e., shadow of the past) (Poppo, Zhou, & Ryu, 2008). A history of positive interactions signals that suppliers' performance is satisfactory and reliable over time; therefore, buyers would pursue the focal, stable relationship. In contrast, an unpleasant history filled with violations attributable to suppliers could strongly indicate not only that the suppliers' performance was below expectation but also that this unpleasant experience might carry into the future. Thus, to avoid such unpleasant experience, buyers are less likely to continue the relationship. We propose that in the wake of supply chain disruptions (before suppliers' attempt to

resolve the violation), the more responsibility buyers attribute to suppliers, the less likely buyers are willing to continue the relationship.

Furthermore, we expect that the negative impact of buyers' attribution on continuity when disruptions occur will endure after suppliers' attempts to resolve the violation. This expectation is based on attribution literature that has suggested attributions' strong influence on subsequent actions may have a persistent impact (e.g., Clapham & Schwenk, 1991; Salancik & Meindl, 1984). Thus, we predict that when disruptions occur buyers' attributions may persistently impact buyers' continuity in the presence of suppliers' corrective behaviors in the resolution process. Hence,

Hypothesis 6. Buyers are less (more) willing to continue the relationships with suppliers into the future (a) before the resolution and (b) after the resolution as buyers attribute more (less) responsibility to suppliers.

Moderations of justice approaches. As suppliers take justice approaches to correct their wrongdoings, buyers who continually scan their supply chains can become aware of these corrective actions and modify their decisions based on this new information (Tomlinson & Mayer, 2009; Weiner, 1985). We theorize that three justice approaches (procedural, interactional, and distributive) suppliers adopt in the wake of disruptions (violations) weaken the negative effects of buyers' attributions to suppliers on buyers' willingness to continue the relationship.

Procedural justice, defined as the perceived fairness of the procedures suppliers employ to resolve disruptions (Wang et al., 2014), enables suppliers to adhere to the rules of consistency, accuracy, bias-suppression, correctability, integrity, and ethicality in the resolution process (Leventhal, 1980b). First, fair procedures signal to buyers (1) that suppliers embrace the blame and use actions instead of excuses through consistent and valuable effort and (2) that suppliers are trustworthy to work with in the future (Lind & Tyler, 1988). Such effort demonstrates suppliers' credibility and consistency in developing policies and procedures (Griffith, Harvey, & Lusch, 2006), helps alleviate buyers' uncertainty in future interactions stemming from suppliers' attributed responsibilities, and rebuilds buyers' confidence in the focal relationship (Ren & Gray, 2009). In addition, through fostering a fruitful environment for coordination and trying all means to reduce the possibility of future conflicts (Ren & Gray, 2009), suppliers demonstrate their skills to resolve conflicts and to work constructively to mitigate negative impacts (Leventhal, 1980b). Buyers can then expect facilitated coordination with suppliers in the future if similar violations occur, even in other aspects of the exchange (e.g., governance, executing plans, etc.) (Luo, 2007b, 2008). This expectation further reduces the uncertainty of buyers due to attributed responsibility to their suppliers and boosts the relationship's continuity.

Interactional justice, defined as buyers' perceptions of the fairness of interpersonal treatment received during the enactment of disruption resolution decisions and procedures (Wang et al., 2014), reduces the negative effects of buyers' attributions on continuity. This result is because even when suppliers are perceived as causing the violation, the fact that they show respect, dignity, and politeness towards buyers (Bies & Moag, 1986; Luo, 2007b) causes buyers to believe these suppliers are truly caring despite their earlier wrongdoings. By speaking directly to the emotional side of the inter-organizational interactions (Greenberg, 1993), suppliers are trying to both resolve

relational conflicts (Narasimhan, Narayanan, & Srinivasan, 2013) and restore buyers' confidence. Buyers, in turn, perceive suppliers as credible and caring partners and, thus, the focal relationship as less risky in the future. This perception dilutes the negative impact of suppliers' attributed responsibility on buyers' willingness to continue. In addition, suppliers' adoption of interactional justice during the resolution process cultivates a collaborative, respectful interactive experience. On the one hand, such interpersonal experiences can help relieve buyers' unsureness of suppliers' future behaviors—a concern that arises from attributed responsibilities (Liu, Huang, Luo, & Zhao, 2012; Uzzi, 1997); furthermore, more pleasant experiences can dispel the negative shadow of the past (i.e., buyers' unpleasant experience with prior violations attributed to suppliers). Thus, the negative impact of suppliers' attributed responsibilities on continuity is further diminished.

Distributive justice, defined as perceived fairness in resource allocations buyers receive (Wang et al., 2014), can be used to correct causal attributions' negative impact on buyers' willingness to continue the relationship. First, through making equitable efforts (Adams, 1965) to correct their wrongdoings, suppliers signal that they care about the buyers' welfare and manage to rectify the negative outcomes of their wrongdoings (Wang et al., 2014). In other words, the fairness in outcome allocation, despite the unfavorable conditions in which suppliers are blamed for causing violations, not only reverses the negative impression buyers have developed of their suppliers (e.g., risky partners) but also fosters a positive perception of suppliers (e.g., dependable partners with whom to collaborate in the future) (Kumar, Scheer, & Steenkamp, 1995; Liu et al., 2012). Second, distributive justice also implies that suppliers are consistent in their deliveries to buyers, regardless of the disruptions' causes; in other words, this form of justice ensures that buyers will not incur unexpected losses (i.e., risks) but instead gain in proportion to their inputs (Luo, 2007b). Thus, even if similar disruptions occur again, there is little chance that buyers will suffer losses unproportionally to their resource inputs. Hence, distributive justice dampens the focal relationship's increasing uncertainty that arises from causal attributions. This dampened uncertainty may help recuperate buyers' continuity. Hence,

> *Hypothesis 7. The negative relationship between buyer-attributed suppliers' responsibility of supply chain disruptions and buyers' willingness to continue relationships with suppliers after resolution is weaker (stronger) as suppliers' use of (a) procedural justice, (b) interactional justice, and (c) distributive justice approaches is higher (lower).*

Moderations of locus of causality. Finally, we propose the moderation effects of the above three justice approaches (to mending causal attributions' negative effects) on continuity are stronger if the locus of causality is external rather than internal. As we have argued, through their justice efforts (procedural, interactional, and distributive), suppliers could send positive messages to buyers that they embrace the blame and take ownership of the violation, therefore fostering a positive image as dependent and caring partners. Because locus of causality reveals the disruption's direct causes—suppliers or external factors (Ford, 1985b; Tomlinson & Mayer, 2009), it could alter how buyers interpret the positive messages of suppliers' justice efforts. In the presence of disruptions caused by *force majeure*, when suppliers nonetheless take justice actions to resolve what they were not directly responsible for, buyers would be likely to perceive the suppliers' justice efforts (a fair process, interpersonal conduct, and outcome allocations) as extra-role efforts (i.e., voluntary commitments outside their duties) in the focal relationships (Kim &

Mauborgne, 1996; Kumar & Nti, 1998). These efforts would (1) create a "halo effect"—amplifying the positive signals of justice efforts that suppliers could be accountable for, showing suppliers truly care about the buyers' welfare, and making collaboration less tricky in the future—and (2) encourage buyers' commitment. In other words, the effectiveness of justice approaches in shaping the impact of buyers' attributed responsibility on relationship continuity might be stronger. In contrast, when disruptions are caused internally (i.e., directly) by suppliers, buyers could tend to interpret suppliers' justice efforts as in-role efforts (i.e., what suppliers are supposed to address) (Kim & Mauborgne, 1996), instead of extra commitments, because suppliers' justice actions are supposed to correct supplier-induced wrongdoings. Thus, the effectiveness of justice approaches may be less substantial. Hence,

Hypothesis 8. The effects of (a) procedural justice, (b) interactional justice, and (c) distributive justice approaches that weaken the negative relationships between buyer-attributed suppliers' responsibility of supply chain disruptions and buyers' willingness to continue the relationships with suppliers are stronger (weaker) when the locus of causality is external (internal).

METHODS

Sample, Procedure and Item Generation

Sample. To examine the causal relationships proposed in our theoretical framework that unfolds buyers' attributional processes and suppliers' justice actions, we conducted a scenario-based experiment. Via a private research software company, we recruited 2040 US professionals with at least one year's experience in business-to-business interactions. We removed 12 responses of participants who finished the study within five minutes and used 2028 responses as our final sample, consisting of professionals with an average of 8.34 years of experience from a wide range of industries (e.g., IT, food, automotive, healthcare, finance, etc.). Common titles were managers, directors, supervisors, CEOs, and business owners. Of the sample, 52.7% were men; 59% of the sample were between 30 and 49 years old.

Procedure. The experiment was conducted online with no financial compensation. Before presenting the scenario, we measured participants' dispositional tendencies that could influence their decision-making in a business-to-business context, namely their propensity to trust (Colquitt, Scott, & LePine, 2007) and involvement (Moorman, Zaltman, & Deshpande, 1992). Propensity to trust measured one's dispositional willingness to rely on others (Colquitt et al., 2007), while involvement measured the degree to which participants are involved in managing the relationships with suppliers (Moorman et al., 1992). We then formally introduced the scenario with a leading passage common across all treatment conditions. Based on this introduction, participants assumed the role of a purchasing manager for a mid-size company manufacturing telecommunication equipment. Participants were also informed of their assumed responsibilities. The subsequent experiment consisted of two treatments (a before-resolution stage and an after-resolution stage). In the before-resolution stage, participants were randomly assigned to one of eight attribution conditions characterizing the cause of a supply chain disruption. We manipulated three attributional dimensions, namely its stability (high versus low), controllability (high versus low) and locus of causality (internal versus external). Descriptions of the attribution conditions, along with the introduction passage, are presented in Table A-1.1. Following this treatment, we measured

participants' responses, including *responsibility attribution* (buyer-attributed supplier's responsibility) and *continuity* (buyer's willingness to continue the relationship).

In the after-resolution stage, participants were first presented a statement of the disruption's impact, designed to be the same across all treatment conditions. Participants were then randomly assigned to one of eight justice conditions characterizing the resolution actions the supplier used. We manipulated three justice approaches: procedural justice (high versus low), interactional justice (high versus low), and distributive justice (high versus low). Descriptions of the justice conditions, along with the bridging statement about the disruption's impact, are shown in Table A-1.2. Following the manipulation, we measured the same set of response variables as the before-resolution stage—*responsibility attribution* and *continuity*. The experiment concluded with the Big-Five personality scale (Gosling, Rentfrow, & Swann, 2003) and a set of demographic questions (i.e., gender, age and years of experience in business-to-business transactions).

In summary, our experiment represented a mixed factorial design—levels of the attribution treatment (2 by 2 by 2) and levels of the justice treatment (2 by 2 by 2) were manipulated between participants, whereas the two treatments were conducted sequentially within participants. To further confirm our instruments' validity and clarity, we conducted an online pilot study with 101 professionals. Responses from the pilot study were reasonable.

Causal attribution manipulation. Based on attribution theory (Weiner, 1986), there are three main dimensions—locus of causality, stability and controllability. *Locus of causality* refers to whether the event (i.e., the disruption) is caused internally by the supplier (N = 1012) or externally by a major tsunami (N = 1016). We used a single-item question for the manipulation check, asking if the incident's primary cause was a failure of the supplier or an act of nature. All participants in the internal-locus condition chose the former, and all participants in the external-locus condition chose the latter.

Stability refers to the degree to which a cause is perceived to either fluctuate or remain constant. In the high-stability condition (N = 989), participants read that "such disruptions occur rather frequently in the past 5 years." In the low-stability condition (N = 1039), participants read "such a disruption rarely occurs in the past 5 years." Previous research further suggested that among causes of an internal locus, examples of stable causes are capacity and ability (those difficult to change in the short term), while examples of unstable causes are mistakes and luck (those that shift quickly) (Weiner, 1986). Thus, among conditions of an internal locus, we described the disruption due to lack of long-term capacity in a high-stability condition and to production schedule mistakes in a low-stability condition. The manipulation was checked by asking participants to what degree they would agree that disruptions in the past 5 years are frequent, on a seven-point Likert scale from 1 (not at all) to 7 (totally). Participants in the high-stability condition expected frequent disruptions significantly more than those in the low-stability condition ($F(1, 2026) = 166.25$, $p = 0.00$).

Controllability refers to the degree of volitional control one has over the outcome (Weiner, 1986). In the high-controllability condition (N = 1006), participants were informed that the supplier had sufficient resources or capability to control the disruption but "chose not to do so"; in the low-controllability condition (N = 1022), participants were told that the supplier had no control

over the outcome due to "limited resources." As a manipulation check, participants were asked to what degree they would agree that the supplier's capability to prevent the disruption from happening is high, on a seven-point Likert scale from 1 (not at all) to 7 (totally). The manipulation check was successful ($F(1, 2026) = 15.12$, $p = 0.00$).

Justice manipulation. Justice theory suggests that three aspects of justice are critical in interorganizational exchanges: procedural, interactional, and distributive justice (Colquitt & Rodell, 2011; Wang et al., 2014). *Procedural justice* refers to the perceived fairness of procedures the supplier employs to repair the disruption. In the high-procedural-justice condition (N = 1010), the supplier had "a well-organized, methodical procedure to resolve the disruption"; in the low-procedure-justice group (N = 1018), the supplier's procedure to resolve the disruption was "disorganized and chaotic." *Interactional justice* is about the perceived fairness of the interpersonal treatment during the resolution. In the high-interactional-justice condition (N = 1007), participants read that they were treated "in a polite manner with respect"; in the low-interactional-justice condition (N = 1021), participants read about being treated "in a rude manner with little respect." *Distributive justice* refers to the outcome distribution's fairness in resolving the disruption. Participants in the high-distributive-justice condition (N = 1020) were informed that the supplier covered the total loss, whereas the total loss was not covered for those in the low-distributive-justice group (N = 1008).

As a manipulation check for all three justice approaches, participants were asked to what degree (on a seven-point Likert scale) they would agree that the methods for the supplier to resolve the disruption were fair. The manipulations were successful for procedural justice ($F(1, 2026) = 25.99$, $p = 0.00$), interactional justice ($F(1, 2026) = 89.11$, $p = 0.00$), and distributive justice ($F(1, 2026) = 55.89$, $p = 0.00$). We further checked the manipulation of distributive justice with one additional question—to what degree participants would agree (on a seven-point Likert scale) that the supplier covered their total loss. Again, the manipulation was successful ($F(1, 2026) = 226.98$, $p = 0.00$).

Measured variables. Response variables include *responsibility attribution* and *continuity*. Responsibility attribution was measured with four items on a seven-point Likert scale (adapted from Hartmann & Moeller, 2014), assessing how much responsibility was attributed to the supplier. Continuity was measured with three items on a seven-point Likert scale (adapted from Wang, Kayande, & Jap, 2010), assessing the intention of continuing the focal relationship with the supplier. We also measured control variables of trust propensity (adopted from Colquitt et al., 2007), involvement (adopted from Moorman et al. 1992), Big-Five personality scale (adopted from Gosling, Rentfrow & Swann, 2003), gender, age (interval coded), and years of experience. Descriptive statistics and correlations are shown in Table A-1.3.

We took two steps to ensure measurement validity and reliability. First, to ensure that our constructs were invariant (i.e., comparable) before and after a treatment, we tested measurement invariance of variables (i.e., *responsibility*, *attribution*, and *continuity*) repeatedly measured by the same participants. We followed Steenkamp and Baumgartner's (1998) procedures and conducted a series of tests (i.e., in the order of configural invariance, metric invariance, and scalar invariance) using a multi-group model in MPLUS 7.2. The configural model, serving as the baseline, requires

the same items to load onto the same factors across groups. The metric model, adding more restrictions to the baseline model, constrains the same factor loadings across groups. The scalar model, the most restrictive among the three, constrains the factor means to be equal across groups. In our case, *groups* refer to responses before and after resolution. We removed two items under responsibility attribution due to low loadings onto the factor in the configural model. With the rest of the items, our measures achieved (1) configural invariance (i.e., the configural model's good fit); (2) metric invariance (i.e., the metric model's fit is no worse than the configural model's); and (3) scalar invariance (i.e., the scalar invariance's fit is no worse than the metric model's). Thus, our measures can be meaningfully compared before and after treatments (Steenkamp & Baumgartner, 1998). We summarized the results in Table A-1.4.

Secondly, we conducted a confirmatory factor analysis of multi-item variables (i.e., trust propensity, involvement, responsibility attribution before/after resolution, and continuity before/after resolution in MPLUS 7.2). The overall model fit is good ($\chi 2$ =1175.43, df = 155, CFI = 0.97, NFI = 0.96, RMSEA = 0.057, SRMR = 0.038). All factor loadings are significant ($p < 0.001$), indicating good convergent validity, except for the first and fourth items of trust propensity, which were thus removed. The average variance extracted (AVE) range is between 0.53 and 0.89, providing further support for convergent validity. Composite reliabilities (CR) range between 0.87 and 0.96, suggesting good reliability. AVE and CR values are shown in Table 3. Factor loadings are presented in Table A-1.5.

Model Specification and Estimation

In our mixed factorial design, treatment and response variables (before and after resolution) were nested within the same subjects. Hence, a hierarchical linear model (HLM) was appropriate. In our HLM, we incorporated Level 1 factors (manipulated variables) and Level 2 factors (subject-level controls). While Level 1 factors allowed us to assess the impact of attribution and justice treatments on response variables, Level 2 factors accommodated subject-related variations (Raudenbush & Bryk, 2002). All variables conformed to normality—a strict assumption of maximum likelihood estimation as implemented in HLM (Raudenbush & Bryk, 2002)—except years of experience, which was log transformed.

To test the main effects of attributional dimensions (H1, H2, and H4), we modeled responsibility attribution before resolution as the response variable, three attribution variables as Level 1 factors, and subject-related controls as Level 2 factors. To further test the interactive effects of attributional dimensions (H3 and H5), we added an interaction term of stability and locus of causality, and of controllability and locus of causality as additional Level 1 factors. For H6(a), we modeled continuity before resolution as the response variable as well as responsibility attribution before resolution and attribution variables as Level 1 factors. The same set of Level 2 factors was used. For H6(b), we modeled continuity after resolution as the response variable, as well as continuity before resolution, responsibility attribution before resolution, and justice variables as Level 1 factors, along with the same Level 2 factors. For H7(a)-(c), we added the justice variables and the interaction terms of responsibility attribution before resolution with justice variables as Level 1 factors. For H8(a)-(c), we split the sample by locus of causality (internal versus external locus) and conducted the same analyses across both groups as we did in H7(a)-(c) (without the main effect of locus of causality). Across all models, we used a random

intercept specification, whereby the intercept of Level 1 factors could vary across subjects (Raudenbush & Bryk, 2002).

RESULTS

Insights from HLM

We first examined the main effects of three attribution variables and found support for H1, H2, and H4. Buyers attributed more responsibility (1) when the disruption was induced internally by the supplier rather than caused externally by *force majeure* (Model 1: B = .95, p = .00), (2) when similar disruptions occurred more frequently in the past (Model 1: B = .47, p = .00), and (3) when the supplier had more volitional control over the disruptions (Model 1: B = .58, p = .00). We next assessed the moderating effects of locus of causality on stability and controllability, respectively, as in H3 and H5. For H3, the interaction term was nonsignificant (Model 2: B = -.07, p = .40); we found no support. For H5, the interaction was significant but in the opposite direction as predicted (Model 2: B = -.32, p = .00); we found no support. Controllability and locus of causality seem to substitute each other in shaping buyers' attribution. Results are summarized in Table A-1.6.

H6(a) and H6(b) predict that the buyer's attributed responsibility before resolution negatively impacts the buyer's willingness to continue the relationship before and after resolution. Our result supported H6a (Model 3: B = -.27, p = .00), but not H6b; there was a positive, marginally significant relationship between responsibility attribution before resolution and continuity after resolution (Model 4: B = .04, p = .08). This counterintuitive finding warrants further investigation. Results are shown in Tables A-1.7 and Table A-1.8.

Studies have demonstrated three justice approaches' positive impact on the relationship's continuity (e.g., Wang et al., 2014). Though we did not theorize justice approaches' main effects on continuity after resolution, our results confirmed previous findings that procedural justice (Model 4: B = .36, p = .00), interactional justice (Model 4: B = 1.04, p = .00), and distributive justice (Model 4: B = .84, p = .00) improved buyers' continuity after resolution. Among the three justices, interactional justice had the most salient impact. H7(a)-(c) predicts that justice approaches weaken responsibility attribution's impact before resolution on continuity after resolution. We found support for interactional justice (Model 5: B = -.16, p = .00) and marginal support for distributive justice (Model 5: B = -.06, p = 0.10). Results are shown in Table A-1.8.

To compare how interactions between justice approaches and responsibility attribution vary based on the disruption's locus of causality (H8(a)-(c)), we conducted HLM analyses for the internal-locus group vis-à-vis the external-locus group and found support, as presented in Table A-1.9 (the internal-locus group) and Table A-1.10 (the external-locus group). When the disruption was caused internally by the supplier, none of the justice approaches significantly moderated the impact of responsibility attribution before resolution on continuity after resolution (Model 7). When the disruption was externally caused, procedural justice (Model 9: B = -.09, p = .08), interactional justice (Model 9: B = -.24, p = .00), and distributive justice (Model 9: B = -.15, p = .00) significantly moderated the relationship. Among the three, interactional justice was the most effective.

Robustness Checks

To test whether our results were sensitive to our random-intercept specification, we ran all the models with a random intercept and slope specification with both the intercept and slope of Level 1 factors allowed to vary across subjects (Raudenbush & Bryk, 2002). We found consistent results with our main analyses.

Because participants were randomly assigned to conditions before and after resolution, the attribution treatment and the justice treatment should be orthogonal to the subjects' characteristics (i.e., subject-level controls). We ran HLM analyses with the same specification as the main analyses but removed all subject-level controls. Results did not change (except p values increased slightly), thus verifying our randomized design.

We initially expected that the amount of responsibility attributed to suppliers should be dictated by the attribution manipulation but *not* by the justice manipulation; therefore, responsibility attribution after resolution should *not* significantly deviate from attribution before resolution. To check this expectation, we compared means of responsibility attribution before resolution (M = 3.86) and after resolution (M = 4.12) using the repeated measure ANOVA. Surprisingly, we found that responsibility attribution after resolution was significantly *higher* on average than before resolution ($F(1) = 36.08$, $p = .00$), indicating that buyers attributed more responsibility to suppliers by observing suppliers' justice efforts. To further examine this surprising pattern, we ran a mixed ANOVA, whereby the between-subject factor was locus of causality and the within-subject factor was time (before and after resolution). We found that the change in responsibility attribution before and after resolution varied significantly depending on locus of causality ($F(1) = 37.69$, $p = .00$). While on average buyers facing an internally-induced disruption did not change their attributions (as expected), buyers facing an externally-induced disruption attributed more responsibility through suppliers' justice resolution. Figure A-1.3 depicts this finding.

We further expected that continuity should be shaped (specifically, should increase) by justice manipulation; in other words, buyers' continuity before resolution should be significantly different from after resolution. We first compared means of continuity before resolution (M = 4.29) and continuity after resolution (M = 4.05) with the repeated measure ANOVA, and we found a significant difference ($F(1) = 42.56$, $p = .00$). However, continuity on average counterintuitively *decreased* through suppliers' justice efforts. This finding suggests that some combination of justice approaches was ineffective in correcting continuity. We also ran a mixed ANOVA model in which the between-subject factor was justice treatment (eight combinations) and the within-subject factor was time (before and after resolution). Table A-1.11 summarizes change in continuity before and after resolution for each justice condition. Only the two groups of high levels of both distributive and interactional justice showed a significant increase in continuity. The rest, especially those having low levels of both interactional and distributive justice, showed a significant decrease in continuity.

Post Hoc Analyses

As suggested by our main analysis (H8) and robustness checks, responsibility attribution's implications seemed to vary by locus of causality. Thus, we wondered whether responsibility attribution would impact buyers' continuity differently before and after resolution by locus of

causality. As a result, we conducted the same HLM analysis as with H6(a) and H6(b) for the internal locus group and external locus group, separately. For H6(a), we found that when the disruption was internally caused, the more responsibility attributed to suppliers before resolution, the less likely buyers would continue the relationship (Model 10: B = -.35, p = .00); when the disruption was externally caused, the relationship was nonsignificant, albeit negative (Model 12: B = -.20, p = .68). We also explored if the nonsignificance was due to an actual curvilinear relationship between the two variables when the disruption was caused externally, and we found a U-shape relationship (Model 13: B = -.91 for the linear term; B = .10, p = .00 for the quadratic term). The curve's minimum point was 4.55 (at the 70th percentile). As shown in Figure A-1.4, in the presence of externally-induced disruptions, buyers are more willing to continue the relationship when either a little or a lot of responsibility is attributed to suppliers; when some ambiguity is in the attribution (neither too little nor too high), buyers are less willing to continue the relationship. Results are shown in Table A-1.12 (internal-locus) and Table A-1.13 (external-locus).

Similarly, we examined if the positive lingering impact of responsibility attribution before resolution on continuity after resolution (H6(b)) would vary across the internal-locus and the external-locus groups. We found that when the disruption was internally caused, there was a negative impact (Model 6: B = -.05, p =.10). Surprisingly, when the disruption was due to *force majeure*, responsibility attribution's lingering impact on continuity after resolution was *positive* (Model 8: B = .10, p = .00). This finding suggests that holding suppliers accountable for disruptions they do not directly cause could be *beneficial* to the focal relationship if suppliers have made justice efforts. Results are presented in Table A-1.9 (internal-locus) and Table A-1.10 (external-locus).

DISCUSSION

As firms increasingly wield supply chains to gain an competitive edge (Hult et al., 2007; Hult et al., 2004), they inevitably deal with disruptions arising from supply chains (Craighead et al., 2007). While scholars have focused mainly on disruptions' impacts, mostly economic, on firms (e.g., Bode & Wagner, 2015; Craighead et al., 2007; Morgeson et al., 2015; Wan & Yiu, 2009), less is known about what firms do (or do not do) about supply chains in response to disruptions, and more importantly, what drives firms' actions/inactions. Thus, we have sought to unveil the mechanisms dictating buyers' following actions about the continuity of their relationships with involved suppliers when disruptions occur: buyers' sensemaking, attributional processes of suppliers' violation (attribution theory), and suppliers' correction of their violation via justice actions (justice theory). Using a vignette-based study with 2028 US business managers, we show that (1) buyers' appraisal of suppliers' wrongdoings along three attributional dimensions dictate how much responsibility buyers attribute to suppliers, then affecting their willingness to continue the relationship, and that (2) beyond directly improving the focal relationship's continuity, suppliers' justice actions may or may not shape the impact of buyers' attributions on continuity.

This study offers several notable contributions. Attribution theory predicts that the more responsibilities attributed to suppliers in the wake of disruptions, the more damaging the impact is on the relationship continuity (e.g., Hartmann & Moeller, 2014). However, we find this prediction holds *only* when the disruption's locus of causality is internal. When the locus is external, high or low levels of attributions are *not* damaging. Instead, when buyers' blame is neither extremely high nor low—some ambiguity exists regarding how much suppliers should be blamed, continuity is

disturbed the most. In contrast to cases when buyers feel certain about their attributions (i.e., low or high levels), their uncertainty about how liable suppliers should be reinforces their perceived uncertainties about the relationship due to the disruption; thus, they exit the relationship to avoid uncertainties. As Tomlinson and Mayer (2009) suggest, the amount of attribution matters under the internal locus but less so under the external locus. We further these scholars' work by showing that under the external locus, while the amount of attribution means little, the attribution's ambiguity matters. Ambiguity is more relevant to externally induced disruptions because the fact that suppliers do not cause disruptions makes appraisals of suppliers' responsibilities ambiguous. This result warrants more research into attributional ambiguities' role (Powell, Lovallo, & Caringal, 2006) in (inter)organization decision-making. For instance, the following questions could be explored: If the locus of causality is relational—an event caused by interfirm interactions (Eberly, Holley, Johnson, & Mitchell, 2011) as opposed to a single party or the context, will ambiguities be more salient? If so, how will ambiguities bias firms' attributions and actions?

Furthermore, while we confirm prior studies' findings that buyers' attributions, beyond an immediate impact, have a persistent effect on continuity (Clapham & Schwenk, 1991; Salancik & Meindl, 1984) that endures suppliers' attempt to resolve their violation, we show that this effect differs across loci of causality (i.e., a negative effect under the internal locus and, counterintuitively, a positive effect under the external locus). Perhaps initial attributions of buyers in the wake of externally-induced disruptions shift into empathy with suppliers as they perceive suppliers as victims (like themselves) of environmental jolts. Hence, buyers may decide to give suppliers a second chance in future interactions. We echo the insight from organization behavior studies (e.g., Lepine & Van Dyne, 2001) that employees develop empathy towards their low-performing peers and thus compensate them if the low performance is attributed to external factors, and we extend that insight to inter-organizational settings. We invite scholars to further uncover the mechanisms driving attributions' long-run impacts.

Overall, we show that buyers' attributions of suppliers' violations (even when suppliers do not cause the event triggering disruptions) are an indispensable herald of their decisions about the relationship's continuity in the short and the long run. This finding highlights the importance for suppliers to understand buyers' attributional process (regardless of the true causes) in order to manage on-going relationships. Suppliers that cause disruptions should realize that the damage of buyers' attributions can be persistent and therefore should prepare to have long-term resolution strategies. On the other hand, suppliers trapped in disruptions by *force majeure* should realize the potential benefits of buyers' attributions (e.g., empathy) and leverage those benefits to enhance relationship outcomes.

Though justice literature seems to paint a rosy picture of justice in the relationship context (e.g., Colquitt & Rodell, 2011; Luo, 2007b; Ren & Gray, 2009), we suggest a more complex story. First, while we confirm prior studies regarding justice's effectiveness in restoring relationship damage from negative incidents (Ren & Gray, 2009; Wang et al., 2014), we emphasize that they are *not* equally valuable. Interactional justice and distributive justice are, respectively, 1.89 and 1.33 times more effective in enhancing continuity than procedural justice. Suppliers should have both interactional *and* distributive justice in place to fully restore the damaged continuity. If either is missing, the relationship's future can be gloomy regardless of procedural justice.

Second, while the literature indicates that justice can be used as a repair strategy to modify the impact of victims' attributions (Lewicki & Bunker, 1996; Tomlinson & Mayer, 2009), we suggest the disruption's locus of causality creates a critical boundary condition by which justice can or cannot effectively shape the impact of buyers' attributions. This idea reinforces a result from service recovery literature indicating that the causes of a failure dictate whether one's recovery effort can correct the failure (Smith et al., 1999). When the locus is internal, the negative impact of buyers' attributions on continuity is too stubborn to be shaped by any of the justice approaches. This concept aligns with prior studies indicating that attributions driven by internal factors can be too persistent to shape (Jones & Davis, 1965). We invite scholars to incorporate alternative perspectives and suggest strategies (e.g., penance) for suppliers to mitigate attributions' negative impact. When the locus is external, three justice actions *suppress* the relationship benefits that suppliers could have gained from buyers' attributions. Furthermore, these suppliers shoulder more blame from buyers. We speculate that suppliers' justice actions render them more ownership of disruptions and signal that they are violators instead of victims, thus defeating the relationship benefits that suppliers could obtain from buyers' empathy. This speculation is consistent with trust repair literature indicating that violators' repair actions (e.g., apologies) can be perceived as gestures that assume ownership (Bottom, Gibson, Daniels, & Murnighan, 2002; Kim et al., 2006) and that acknowledge guilt (Gillespie & Dietz, 2009). Nonetheless, the net effects of justice are positive. Therefore, we suggest that suppliers in externally-induced disruptions may take justice actions in the resolutions; however, they should be cautious of what their justice actions imply.

Finally, in contrast to prior attribution studies of individuals' emotions and perceptions (e.g., Folkes, 1984; Vaidyanathan & Aggarwal, 2003) suggesting a complementary effect between locus of causality and controllability, we surprisingly have found that they weaken each other's influence. When suppliers have little ability to influence the cause of disruptions, buyers attribute more responsibilities to suppliers if the cause is internal rather than external. However, when suppliers are perceived to have control, buyers blame suppliers regardless of the locus of causality. We thus suggest additional efforts to explore how established results in the attribution research at the individual level can be extended and refined to the inter-organizational context.

APPENDIX 1

Table A-1.1: Description of Attribution Conditions

Condition	*Description*	*# participants*
Introduction	Imagine you are a purchasing manager for a mid-sized manufacturing company in the United States that makes telecommunication equipment. You have worked with the company for the last 5 years, and a major part of your responsibility in the company is to manage supplier relationships. Any disruption in the supply chain could cause substantial harm to the company. You have been pleased (generally) with the performance of all of the suppliers since your arrival at the company. However, one supplier—TechSup—recently informed you about a disruption.	2028
(A1): Internal locus of causality X low stability X low controllability	The disruption was caused by TechSup: it was due to the head of its manufacturing department who messed up the production schedules and produced incompatible components for your newly developed telecommunication equipment. Unfortunately, given limited resources, TechSup was unable to provide a training program in production scheduling to their manufacturing managers. Nevertheless, such a disruption rarely occurs in the past 5 years.	258
(A2): Internal locus of causality X low stability X high controllability	The disruption was caused by TechSup: it was due to the head of its manufacturing department who messed up the production schedules and produced incompatible components for your newly developed telecommunication equipment. However, as a global leader, TechSup had the capability to provide a master training program in production scheduling to its manufacturing managers, but they chose not to do so. Nevertheless, such a disruption rarely occurs in the past 5 years.	256
(A3): Internal locus of causality X high stability X low controllability	The disruption was caused by TechSup: it was due to TechSup's lack of long-term capacity to produce compatible components for your newly developed telecommunication equipment. Unfortunately, given limited resources, TechSup was having a hard time to improve its manufacturing capacity. In fact, such disruptions occur rather frequently in the past 5 years.	239
(A4): Internal locus of causality X high stability X high controllability	The disruption was caused by TechSup: it was due to TechSup's lack of long-term capacity to produce compatible components for your newly developed telecommunication equipment. In fact, such disruptions occur rather frequently in the past 5 years. However, you believe that, as a global leader, TechSup had sufficient resources in improving its manufacturing capacity, but they chose not to do so.	259
(A5): External locus of causality X low stability X low controllability	The disruption was caused by an act of nature: a major tsunami affected the key seaport where TechSup has long used to receive its raw materials. As a result, TechSup had to halt production of parts used in your newly developed telecommunication equipment. Unfortunately, given limited resources, TechSup had little capability to obtain raw materials from alternative sources. Nevertheless, such a disruption rarely occurs in the past 5 years.	267

Table A-1.1 (Continued)

Condition	*Description*	*# participants*
(A6): External locus of causality X low stability X high controllability	The disruption was caused by the by an act of nature: a major tsunami affected the key seaport where TechSup has long used to receive its raw materials. As a result, TechSup had to halt production of parts used in your newly developed telecommunication equipment. However, you believe that, as a global leader, TechSup was able to obtain raw materials from alternative sea ports at minimal costs, but they chose not to do so. Nevertheless, such a disruption rarely occurs in the past 5 years.	258
(A7): External locus of causality X high stability X low controllability	The disruption was caused by an act of nature: a major tsunami affected the key seaport where TechSup has long used to receive its raw materials. As a result, TechSup had to halt production of parts used in your newly developed telecommunication equipment. In fact, such a disruption occurs rather frequently in the past 5 years. Unfortunately, given limited resources, TechSup had little capability to obtain raw materials from alternative sources.	258
(A8): External locus of causality X high stability X high controllability	The disruption was caused by an act of nature: a major tsunami affected the key seaport where TechSup has long used to receive its raw materials. As a result, TechSup had to halt production of parts used in your newly developed telecommunication equipment. In fact, such a disruption occurs rather frequently in the past 5 years. However, you believe that, as a global leader, TechSup was able to obtain raw materials from alternative sea ports at minimal costs, but they chose not to do so.	233

Table A-1.2: Description of Justice Conditions

Condition	*Description*	*# participants*
Bridge statement from before-repair stage to after-repair stage	In retrospect, this disruption delayed the delivery of parts by 3 weeks and cost your company significant loss in production and penalties for failing to deliver your equipment to your own customers. TechSup's response to the situation was as follows:	2028
(J1): High Procedural X High Interactional X High Distributive	TechSup established a well-organized, methodical procedure to resolve the disruption. During the whole disruption resolution process, this supplier treated your firm in a polite manner and with great respect. In the end, this supplier not only offered to pay the entire penalty agreed upon in the contract with your company, but will also pay additional to cover your total loss.	253
(J2): High Procedural X High Interactional X Low Distributive	TechSup established a well-organized, methodical procedure to resolve the disruption. During the whole disruption resolution process, this supplier treated your firm in a polite manner and with great respect. However, in the end, this supplier offered to pay the entire penalty agreed upon in the contract with your company, which is lower than the actual cost of the disruption.	243
(J3): Low Procedural X High Interactional X High Distributive	TechSup's procedure to resolve the disruption was disorganized and chaotic. However, during the whole disruption resolution process, this supplier treated your firm in a polite manner and with great respect. In the end, this supplier not only offered to pay the entire penalty agreed upon in the contract with your company, but will also pay additional to cover your total loss.	253
(J4): Low Procedural X High Interactional X Low Distributive	TechSup's procedure to resolve the disruption was disorganized and chaotic. In the end, this supplier offered to pay the entire penalty agreed upon in the contract with your company, which is lower than the actual cost of the disruption. However, during the whole disruption resolution process, this supplier treated your firm in a polite manner and with great respect.	258
(J5): High Procedural X Low Interactional X High Distributive	TechSup established a well-organized, methodical procedure to resolve the disruption. In the end, this supplier not only offered to pay the entire penalty agreed upon in the contract with your company, but will also pay additional to cover your total loss. However, during the whole disruption resolution process, this supplier treated your firm in a rude manner and with little respect.	258
(J6): High Procedural X Low Interactional X Low Distributive	TechSup established a well-organized, methodical procedure to resolve the disruption. However, during the whole disruption resolution process, this supplier treated your firm in a rude manner and with little respect. In the end, this supplier offered to pay the entire penalty agreed upon in the contract with your company, which is lower than the actual cost of the disruption.	256

Table A-1.2 (Continued)

Condition	*Description*	*# participants*
(J7): Low Procedural X Low Interactional X High Distributive	TechSup's procedure to resolve the disruption was disorganized and chaotic. In addition, during the whole disruption resolution process, this supplier treated your firm in a rude manner and with little respect. However, in the end, this supplier not only offered to pay the entire penalty agreed upon in the contract with your company, but will also pay additional to cover your total loss.	256
(J8): Low Procedural X Low Interactional X Low Distributive	TechSup's procedure to resolve the disruption was disorganized and chaotic. In addition, during the whole disruption resolution process, this supplier treated your firm in a rude manner and with little respect. In the end, this supplier has offered to pay the entire penalty agreed upon in the contract with your company, which is lower than the actual cost of the disruption.	251

Table A-1.3: Descriptive Statistics, Correlations and Reliability

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender														
2. Age	.10**													
3. Years of experience	.05*	.48**												
4. Trust propensity	.01	-.01	.02											
5. Involvement	-.10**	.02	.04*	.30**										
6. Extraversion	-.12**	.06**	.07**	-.05*	.08**									
7. Agreeableness	.21**	-.10**	-.05*	.02	-.13**	-.13**								
8. Conscientiousness	-.14**	.08**	.09**	-.14**	.11**	.25**	-.36**							
9. Emotion	.03	-.11**	-.10**	.02	-.12**	-.23**	.47**	-.53**						
10. Openness	-.16**	.06**	.05*	-.16**	.14**	.33**	-.37**	.57**	-.41**					
11. Responsibility attribution before resolution	.10**	-.01	.02	.19**	.02	.00	.12**	-.14**	.08**	-.14**				
12. Continuity before resolution	-.03	-.00	-.02	.27**	.15**	-.04	.08**	-.13**	.09**	-.13**	-.25**			
13. Responsibility attribution after resolution	.02	.00	.02	.10**	.04	-.07**	.09**	-.09**	.07**	-.11**	.37**	-.12**		
14. Continuity after resolution	.02	.01	.03	.23**	.07**	-.01	.08**	-.16**	.06*	-.15**	-.11**	.54**	-.42**	
Mean	1.55	1.80	8.64	4.46	5.76	4.47	3.14	5.47	2.96	5.29	3.86	4.29	4.12	4.05
Standard deviation	.52	.65	6.48	1.24	1.37	1.28	1.20	1.28	1.26	1.19	1.73	1.67	1.77	1.85
Min.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max.	2.00	5.00	55.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Composite reliability				.92	.87						.89	.95	.87	.96
Average variance explained				.73	.53						.80	.85	.77	.89

*p < 0.05
**p < 0.01
***p < 0.00

Table A-1.4: Measurement Invariance Tests Results

	$\chi 2$	d.f.	CFI	TLI	RMSEA	$\Delta \chi 2$/ Δd.f.	p-value
Configural Model	4.36	8	1.00	1.00	0.00	-	-
Metric Model	13.47	11	1.00	1.00	0.01	3.04	0.38
Scalar Model	53.19	16	1.00	1.00	0.03	7.94	0.16

Table A-1.5: Confirmatory Factor Analysis Results

Factor and Scale Items	Standard coefficient	Standard error	t-value
Responsibility attribution before resolution: Please indicate the extent to which you agree with the following statements about the previously described situation (Hartmann & Moeller, 2014)**:**			
TechSup is liable[a]	-	-	-
TechSup is responsible[a]	-	-	-
TechSup is careless	.89	.01	70.49
TechSup is thoughtless	.90	.01	70.83
Continuity before resolution: As a manager responsible for managing supplier relationships, please indicate your willingness to continue the relationship with TechSup in the long run: (Wang et al., 2010)			
you are willing to maintain the relationship with TechSup far into the future	.94	.00	245.68
you expect to continue working with TechSup on a long-term basis	.95	.00	268.28
you will sustain the relationship with TechSup	.88	.01	149.05
Responsibility attribution after resolution: Please indicate the extent to which you agree with the following statements about the previously described situation (Hartmann & Moeller, 2014)**:**			
TechSup is liable	-	-	-
TechSup is responsible	-	-	-
TechSup is careless	.90	.01	75.41
TechSup is thoughtless	.86	.01	71.78
Continuity before resolution: As a manager responsible for managing supplier relationships, please indicate your willingness to continue the relationship with TechSup in the long run: (Wang et al., 2010)			
you are willing to maintain the relationship with TechSup far into the future	.95	.00	319.04
you expect to continue working with TechSup on a long-term basis	.96	.00	358.91
you will sustain the relationship with TechSup	.91	.01	199.78

Table A-1.5 (Continued)

Factor and Scale Items	Standard coefficient	Standard error	t-value
Propensity to Trust: Please answer the following questions about your general perceptions about trust (Colquitt et al., 2007):			
One should be very cautious with strangers[a]	-	-	-
Most experts tell the truth about the limits of their knowledge	.71	.01	54.42
Most people can be counted on to do what they say they will do	.77	.01	69.61
These days, you must be alert or someone is likely to take advantage of you[a]	-	-	-
Most salespeople are honest in describing their products	.66	.01	45.89
Most repair people will not overcharge people who are ignorant of their specialty	.79	.01	76.37
Most people answer public opinion polls honestly	.75	.01	63.20
Most adults are competent at their jobs	.69	.01	51.86
Involvement: Please describe your view on the subject of establishing trust between a company and its suppliers (Moorman et al., 1992):			
It's Important to me	.85	.01	110.14
It's relevant to me	.86	.01	111.42
It's personally consequential	.82	.01	94.84
It's personally significant	.89	.01	138.29
***Gender*:** Please indicate your gender: Female (1), Male (2), Prefer not to say (3)			
Age: What's your current age? 18-29 (1), 30-49 (2), 50-64 years (3), 65 years and above (4), Prefer not to say (5)			
Big-five personality: Here are a number of personality traits that may or may not apply to you. Please rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other (Gosling et al., 2003):			
Extraversion: Extroverted, enthusiastic; Reserved, quiet.			
Agreeableness: Critical, quarrelsome; Sympathetic, warm			
Conscientiousness: Dependable, self-disciplined; Disorganized, careless			
Emotional Stability: Anxious, easily upset; Calm, emotionally stable			
Openness: Open to new experiences, complex; Conventional, uncreative			

a. Dropped due to low factor loadings

Table A-1.6: Effects of Attribution Variables on Perceived Responsibility Before Resolution (H1-5)

	Hypotheses (Predicted Direction)	DV = Perceived Responsibility Before Resolution (Time 1) Model 1				DV = Perceived Responsibility Before Resolution (Time 1) Model 2			
Predictors		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		2.81	.07	41.28	.00	-.70	.05	-14.56	.00
Causal Attributions									
Locus of Causality (external as baseline)	**H1 (+)**	**.95**	**.04**	**13.62**	**.00**	.31	.06	5.47	.00
Stability (low as baseline)	**H2 (+)**	**.47**	**.07**	**6.70**	**.00**	.50	.06	8.76	.00
Controllability (low as baseline)	**H4 (+)**	**.58**	**.07**	**8.38**	**.00**	.73	.07	10.88	.00
Moderations									
Stability X Locus of Causality	**H3 (+)**					**-.07**	**.08**	**-.850**	**.40**
Controllability X Locus of Causality	**H5 (+)**					**-.32**	**.08**	**-3.970**	**.00**
Control Variables (Random effect covariance estimate)		Estimate	Standard Error	Z-value	*P*-value (one-tailed)	Estimate	Standard Error	Z-value	*P*-value (one-tailed)
Intercept		.00	.	.	.	.00	.	.	.
Interpersonal									
Involvement		.00	.	.	.	.00	.	.	.
Trust Propensity		.19	.03	6.20	.00	.19	.03	6.26	.00
Individual									
Agreeableness		.02	.02	.81	.21	.02	.02	.77	.22
Openness		.07	.03	2.12	.02	.07	.03	2.00	.02
Conscientiousness		.11	.04	2.89	.00	.11	.04	2.81	.00
Emotional Stability		.01	.02	.54	.29	.02	.02	.62	.27
Extraversion		.00	.	.	.	.00	.	.	.
Gender		.00	.	.	.	.00	.	.	.
Age		.00	.	.	.	.00	.	.	.
Years of Experience		.00	.	.	.	.00	.	.	.

Table A-1.7: Effects of Perceived Responsibility on Continuity Before Resolution (H6)

Predictors	Hypotheses (Predicted Direction)	DV = Continuity Before Resolution Model 3			
		Coefficient	Standard Error	t-Value	*P*-Value (one-tailed)
Intercept		5.88	.07	79.95	.00
Perceived Responsibility Before Resolution (PR_Before)	**H6a (-)**	**-.27**	**.02**	**-12.97**	**.00**
Causal Attributions					
Locus of causality (external as baseline)		-.42	.07	-6.42	.00
Stability (low as baseline)		-.82	.06	-12.74	.00
Controllability (low as baseline)		.12	.06	1.85	.06
Control Variables (Random effect covariance estimate)		Estimate	Standard Error	Z-value	*P*-value (one-tailed)
Intercept		.00	.	.	.
Interpersonal					
Involvement		.12	.04	2.67	.00
Trust Propensity		.58	.08	6.93	.00
Individual					
Agreeableness		.00	.	.	.
Openness		.13	.07	1.92	.03
Conscientiousness		.13	.07	1.71	.04
Emotional Stability		.01	.06	.09	.46
Extraversion		.09	.05	1.85	.03
Gender		.00	.	.	.
Age		.00	.	.	.
Years of Experience		.00	.	.	.

Table A-1.8: Effects of Perceived Responsibility Before Resolution and Justice Variables on Continuity After Resolution (H7)

	Hypotheses (Predicted Direction)	DV = Continuity After Resolution Model 4				DV = Continuity After Resolution Model 5			
Predictors		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		.20	.15	1.34	.18	-.31	.19	-1.62	.11
Perceived Responsibility Before Resolution (PR_Before)	**H6b (-)**	**.04**	**.02**	**1.77**	**.08**	.17	.04	4.68	.00
Continuity Before Resolution		.60	.02	28.68	.00	.60	.02	28.79	.00
Causal Attributions									
Locus of Causality (external as baseline)		-.10	.06	-1.61	.11	-.11	.06	-1.73	.08
Stability (low as baseline)		.04	.06	.69	.49	.05	.06	.76	.45
Controllability (low as baseline)		.08	.06	1.35	.18	.09	.06	1.39	.17
Resolution Strategies									
Procedure Justice		.36	.06	5.86	.00	.56	.15	3.77	.00
Interactional Justice		1.04	.06	17.18	.00	1.65	.15	11.13	.00
Distributive Justice		.84	.06	13.85	.00	1.06	.15	7.15	.00
Moderations									
PR_Before X Procedure Justice	**H7 (a) (-)**					**-.06**	**.04**	**-1.52**	**.13**
PR_Before X Interactional Justice	**H7 (b) (-)**					**-.16**	**.04**	**-4.47**	**.00**
PR_Before X Distributive Justice	**H7 (c) (-)**					**-.06**	**.04**	**-1.65**	**.10**
Control Variables (Random effect covariance estimate)		Estimate	Standard Error	Z-value	*P*-value (one-tailed)	Estimate	Standard Error	Z-value	*P*-value (one-tailed)
Intercept		.00	.	.	.	.00	.	.	.
Interpersonal									
Involvement		.06	.03	1.62	.05	.05	.03	1.44	.07
Trust Propensity		.34	.06	5.43	.00	.35	.06	5.68	.00
Individual									
Agreeableness		.17	.07	2.53	.01	.15	.07	2.23	.01
Openness		.14	.07	1.92	.03	.13	.07	1.78	.04
Conscientiousness		.02	.06	.28	.39	.02	.06	.28	.39
Emotional Stability		.15	.06	2.48	.01	.15	.06	2.58	.00

Table A-1.8 (Continued)

Predictors	Hypotheses (Predicted Direction)	DV = Continuity After Resolution Model 4				DV = Continuity After Resolution Model 5			
		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Extraversion		.00	.	.	.	.00	.	.	.
Gender		.03	.21	.14	.44	.01	.18	.04	.49
Age		.02	.05	.39	.35	.03	.04	.77	.22
Years of Experience		.00	.	.	.	.00	.	.	.

Table A-1.9: Internal-Locus: Effects of Perceived Responsibility Before Resolution and Justice Variables on Continuity After Resolution

	Hypotheses (Predicted Direction)	DV = Continuity After Resolution Model 6 Internal Locus				DV = Continuity After Resolution Model 7 Internal Locus			
Predictors		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		.40	.22	-1.84	.07	.30	.30	.98	.33
Perceived Responsibility Before Resolution (PR_Before)	**Post-Hoc**	**-.05**	**.03**	**-1.64**	**.10**	-.03	.06	-.49	.62
Continuity Before Resolution		0.61	.03	21.77	.00	0.61	.03	21.59	.00
Causal Attributions									
Stability (low as baseline)		.09	.09	1.04	.30	.10	.09	1.09	.28
Controllability (low as baseline)		.10	.09	1.12	.26	.09	.09	1.11	.27
Resolution Strategies									
Procedure Justice		.40	.08	4.73	.00	.51	.26	1.94	.05
Interactional Justice		.95	.08	11.18	.00	1.18	.26	4.48	.00
Distributive Justice		.85	.08	10.07	.00	.69	.26	2.62	.01
Moderations									
PR_Before X Procedure Justice	**H8 (a)**					**-.03**	**.06**	**-.44**	**.66**
PR_Before X Interactional Justice	**H8 (b)**					**-.06**	**.06**	**-.96**	**.34**
PR_Before X Distributive Justice	**H8 (c)**					**.04**	**.06**	**.67**	**.50**
Control Variables (Random effect covariance estimate)		Estimate	Standard Error	Z-value	*P*-value (one-tailed)	Estimate	Standard Error	Z-value	*P*-value (one-tailed)
Intercept		.00	.	.	.	.00	.	.	.
Interpersonal									
Involvement		.00	.	.	.	.00	.	.	.
Trust Propensity		.41	.09	4.78	.00	.41	.09	4.79	.00
Individual									
Agreeableness		.13	.09	1.46	.07	.12	.09	1.40	.08
Openness		.17	.11	1.59	.06	.17	.11	1.54	.06
Conscientiousness		.01	.09	.10	.46	.02	.10	.23	.41
Emotional Stability		.05	.07	.69	.24	.06	.08	.75	.23
Extraversion		.03	.07	.44	.33	.03	.07	.38	.35
Gender		.00	.	.	.	.00	.	.	.
Age		.04	.05	.93	.17	.05	.05	1.03	.15
Years of Experience		.00	.	.	.	.00	.	.	.

Table A-1.10: External-Locus: Effects of Perceived Responsibility Before Resolution and Justice Variables on Continuity After Resolution

Predictors	Hypotheses (Predicted Direction)	DV = Continuity After Resolution Model 8 External Locus				DV = Continuity After Resolution Model 9 External Locus			
		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		.15	.21	.69	.49	-.61	.25	-2.43	.02
Perceived Responsibility Before Resolution (PR_Before)	**Post-Hoc**	**.10**	**.03**	**3.71**	**.00**	.34	.05	6.67	.00
Continuity Before Resolution		0.57	.03	18.20	.00	0.57	.03	18.38	.00
Causal Attributions									
Stability (low as baseline)		-.02	.09	-.26	.80	-.04	.09	-.48	.63
Controllability (low as baseline)		.04	.09	.45	.65	.04	.09	.47	.64
Resolution Strategies									
Procedure Justice		.33	.09	3.75	.00	.60	.19	3.26	.00
Interactional Justice		1.10	.09	12.61	.00	1.89	.19	10.22	.00
Distributive Justice		.86	.09	9.86	.00	1.35	.19	7.26	.00
Moderations									
PR_Before X Procedure Justice	**H8 (a)**					**-.09**	**.05**	**-1.75**	**.08**
PR_Before X Interactional Justice	**H8 (b)**					**-.24**	**.05**	**-4.75**	**.00**
PR_Before X Distributive Justice	**H8 (c)**					**-.15**	**.05**	**-2.93**	**.00**
Control Variables (Random effect covariance estimate)		Estimate	Standard Error	Z-value	*P*-value (one-tailed)	Estimate	Standard Error	Z-value	*P*-value (one-tailed)
Intercept		.00	.	.	.	.00	.	.	.
Interpersonal									
Involvement		.10	.05	1.93	.03	.08	.05	1.62	.05
Trust Propensity		.23	.09	2.55	.01	.23	.08	2.77	.00
Individual									
Agreeableness		.17	.10	1.80	.04	.16	.10	1.60	.05
Openness		.14	.11	1.35	.09	.11	.11	1.02	.15
Conscientiousness		.00	.	.	.	.00	.	.	.
Emotional Stability		.20	.09	2.38	.01	.20	.09	2.35	.01
Extraversion		.00	.	.	.	.00	.	.	.
Gender		.09	.18	.51	.30	.10	.22	.46	.32
Age		.00	.	.	.	.01	.07	.09	.46
Years of Experience		.01	.03	.30	.38	.03	.04	.80	.21

Table A-1.11: Before-After Change in Continuity by Justice Treatment Condition

Justice Treatment Conditions			Change in Continuity (Continuity Before Resolution – Continuity After Resolution)				*t-value*	*P-Value (two-tailed)*
Procedural Justice	Interactional Justice	Distributive Justice	*Mean*	*Std. Err*	*95% CI*			
					Lower	*Upper*		
High	**High**	**High**	**-.81**	**.09**	**-.99**	**-.62**	**-8.57**	**.00**
High	High	Low	-.00	.09	-.18	.18	-.02	.99
High	Low	High	.26	.10	.06	.46	2.56	.01
High	Low	Low	.98	.10	.77	1.18	9.40	.00
Low	**High**	**High**	**-.57**	**.10**	**-.76**	**-.38**	**-5.83**	**.00**
Low	High	Low	.38	.09	.21	.54	4.39	.00
Low	Low	High	.45	.11	.24	.66	4.26	.00
Low	Low	Low	1.27	.11	1.06	1.48	11.91	.00

Table A-1.12: Internal-Locus: Linear and Curvilinear Effects of Responsibility Attribution on Continuity Before Resolution[a]

		DV = Continuity Before Resolution				DV = Continuity Before Resolution			
		Model 10 Internal Locus				Model 11 Internal Locus			
Predictors		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		5.63	.14	40.49	.00	6.01	.29	20.67	.00
Perceived Responsibility Before Repair (PR_Before)	**Linear**	**-.35**	**.03**	**-10.83**	**.00**	**-.56**	**.15**	**-3.73**	**.00**
PR_Before Squared	**Quadratic**					**.03**	**.02**	**1.45**	**.15**
Causal Attributions									
Stability (low as baseline)		-.71	.09	-7.50	.00	-.72	.10	-7.54	.00
Controllability (low as baseline)		.24	.09	2.54	.01	.22	.09	2.40	.02

a. Results of control variables are omitted.

Table A-1.13: External-Locus: Linear and Curvilinear Effects of Responsibility Attribution on Continuity Before Resolution[a]

		DV = Continuity Before Resolution				DV = Continuity Before Resolution			
		Model 12 External Locus				Model 13 External Locus			
Predictors		Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)	Coefficient	Standard Error	t-Value	*P*-Value (two-tailed)
Intercept		5.76	.09	65.70	.00	6.66	.15	43.02	.00
Perceived Responsibility Before Resolution (PR_Before)	**Linear**	**-.20**	**.03**	**-7.31**	**.00**	**-.91**	**.11**	**-8.54**	**.00**
PR_Before Squared	**Quadratic**					**.10**	**.01**	**6.98**	**.00**
Causal Attributions									
Stability (low as baseline)		-.93	.09	-10.61	.00	-.89	.09	-10.29	.00
Controllability (low as baseline)		-.03	.09	-.32	.75	.05	.08	.55	.59

a. Results of control variables are omitted.

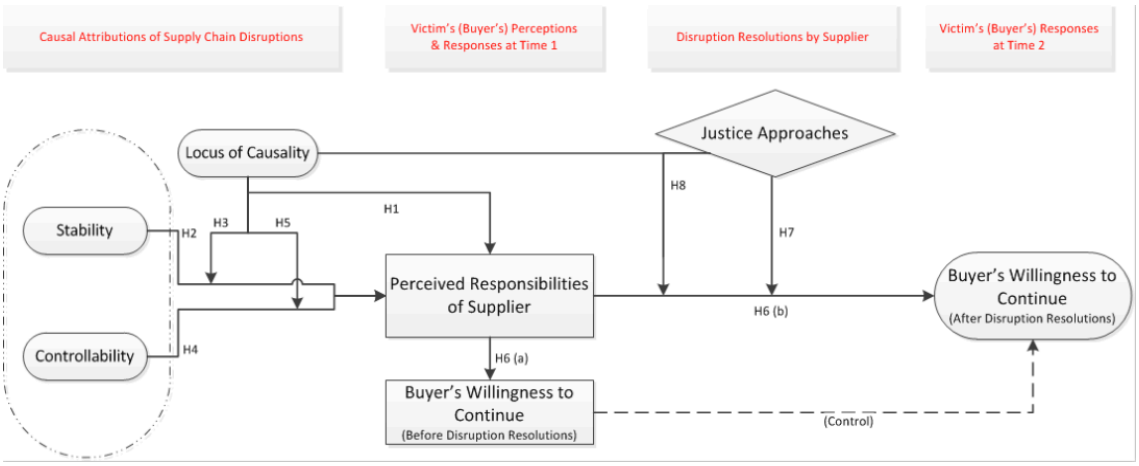


Figure A-1.1: Theoretical Framework

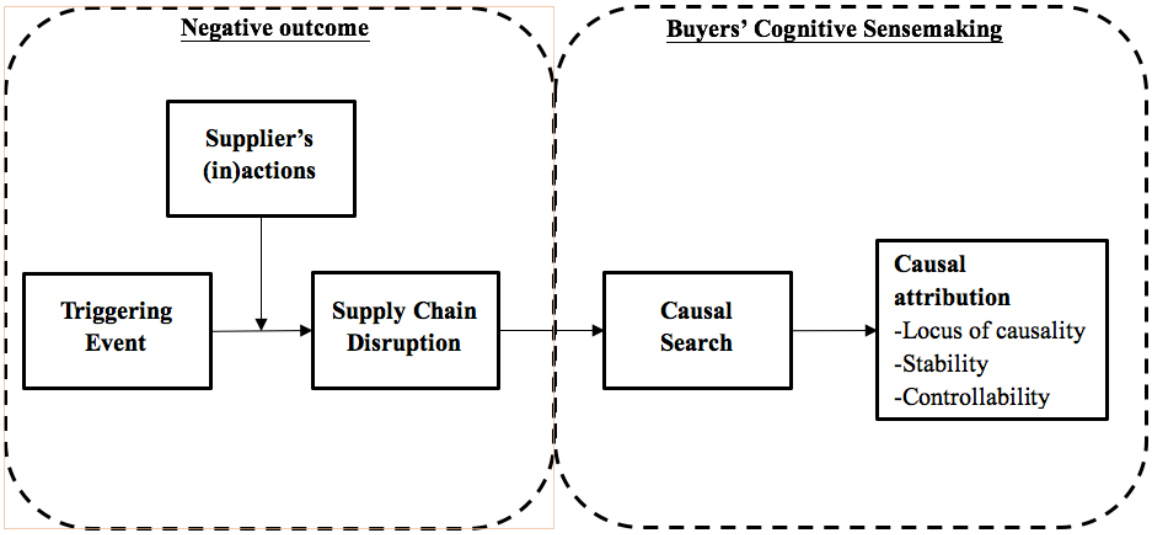


Figure A-1.2: Buyers' Attributional Process

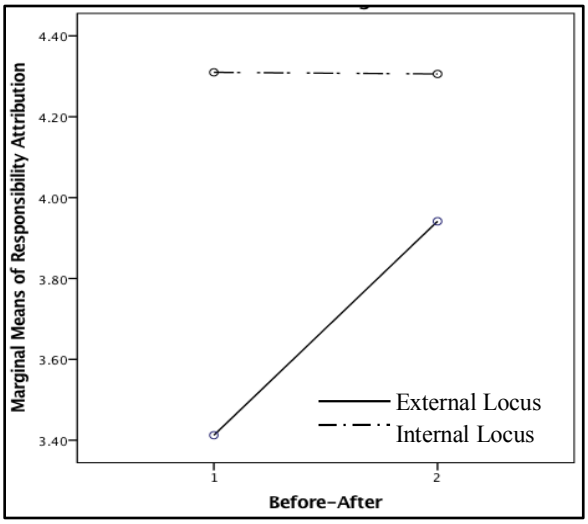


Figure A-1.3: Changes in Responsibility Attribution Before and After Resolution by Locus of Causality

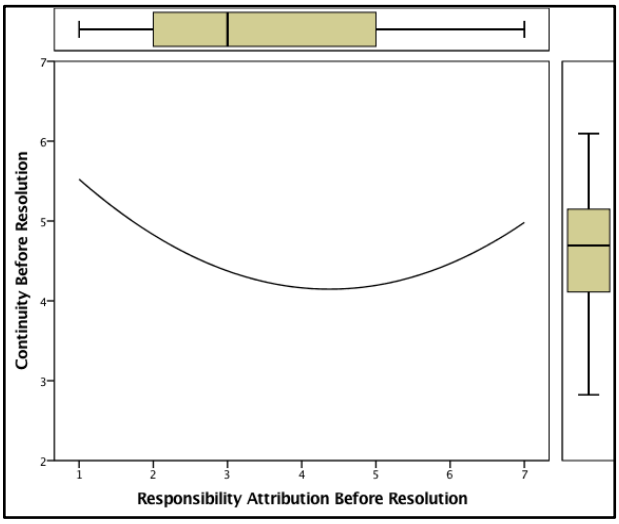


Figure A-1.4: Curvilinear Relation Between Responsibility Attribution and Continuity (External Locus)

CHAPTER II
WHEN IS THE SUPPLIER'S MESSAGE "LOUD AND CLEAR"? MIXED SIGNALS FROM SUPPLIER-INDUCED DISRUPTIONS AND THE RESPONSE

ABSTRACT

Following supplier-induced disruptions, suppliers may undertake recovery actions in hopes of reducing damage to the focal exchange with buyers. While research shows that the absence of suppliers' recovery almost always leads to a deteriorated relationship, it is less clear if—or more likely *when*—the presence of suppliers' recovery efforts guarantees a restored relationship. We focus on two boundary conditions for a specific set of recovery actions (i.e., suppliers' justice actions): disruption severity and buyers' supply chain uncertainty. Through the lens of signaling theory, we frame supplier-induced disruptions as negative signals from suppliers (signalers) to buyers (receivers), followed by suppliers' justice actions as positive signals. We develop rival hypotheses of whether the negative signal's strength (disruption severity) and uncertainty in the signaling environment (supply chain uncertainty) heighten or dampen positive signals' effectiveness. In addition, we explore whether some signals are more effective than others given the type of negative signal (disruptions due to quantity shortage, delays, or quality). Using the critical incident technique to capture two disruption events from 302 Chinese buyers (i.e. 604 observations), we found that the messages of suppliers conveyed through their justice actions may or may not be "loud and clear," depending on the disruption severity, disruption type, and supply chain uncertainty. Though justice actions seem to signal suppliers' positive attributes, in some cases they can indicate negative attributes if they fail to fit the specific disruption. In other cases, they can deliver messages conflicting with the negative signal. We provide substantive guidance for suppliers about the justice action to adopt in response to disruptions.

INTRODUCTION

Supply chain disruptions—unplanned delays or stoppages of planned product flow (Craighead et al., 2007)—can have a broad impact on firms' operational outcomes (Craighead et al., 2007; Hendricks & Singhal, 2005a) and shareholder value (Hendricks & Singhal, 2003b, 2005c; Hendricks et al., 2009). When the disruption is supplier-induced, the event can have a greater impact on the focal buyer-supplier exchange (Reimann, Kosmol, & Kaufmann, 2017a; Wang et al., 2014). Therefore, suppliers may undertake recovery actions in hopes of reducing the disruption's damage (e.g., restoring trust) to their relationships with buyers (Wang et al., 2014). While it has been suggested that the absence of suppliers' recovery efforts normally leads to a deteriorated relationship (Reimann et al., 2017a), the empirical evidence is not yet clear if (or, more likely, *when*) suppliers' recovery efforts guarantee a restored relationship. As a related research stream, service recovery literature indicates that a firm's recovery effectiveness seems to be contingent on such factors as service failure's severity, customer attributes, and organization structure (e.g., Craighead, Karwan, & Miller, 2004; Liao, 2007; Smith et al., 1999; Smith, Karwan, & Markland, 2009). Despite these insights, little disruption research has focused on boundary conditions (Goldsby, Michael Knemeyer, Miller, & Wallenburg, 2013) related to the effectiveness of suppliers' recovery efforts in the wake of supplier-induced disruptions.

We focus on two such boundary conditions. First, following related research on service failure (Craighead et al., 2004; Smith et al., 1999), psychological contract breach (Eckerd et al., 2013), and disruption (Reimann et al., 2017a), we identify severity of supplier-induced disruptions as a critical condition. Despite the considerable attention on severity, its impact on the subsequent recovery's effectiveness remains unclear (e.g., Craighead et al., 2004). On the one hand, higher

severity implies greater loss from negative events (Craighead et al., 2007); therefore, the same level of recovery efforts may not be as effective to compensate for the loss as in less severe events (Smith et al., 1999). On the other hand, higher severity increases such events' saliency (Eckerd et al., 2013), drawing buyers' attention; thus, buyers are more likely to observe suppliers' positive gestures by way of their recovery efforts. Hence, two competing lines of argument raise the question of whether the severity of supplier-induced disruptions strengthens or weakens the effectiveness of suppliers' recovery actions.

Second, following the notion that firms' perceptions are shaped by their environment (e.g., Bourgeois, 1980; Duncan, 1972), we focus on one such context—buyers' supply chains. While recent studies of disruption and service recovery have explored how surroundings affect recovery, they mainly focus on the structure of the focal organization or relationship (Reimann et al., 2017a; Smith et al., 2009); little attention is given to the focal supply chain. We identify the risk uncertainty in buyers' supply chains as a boundary condition. On the one hand, uncertainty implies a dynamic environment filled with volatile information (Leblebici & Salancik, 1981), making it more difficult for buyers to sort through the information and correctly appraise suppliers' recovery efforts. On the other hand, facing high uncertainty, buyers can be propelled to seek information to reduce uncertainty; thus, they become more attuned to suppliers' recovery and value their actions. Like those for severity, competing arguments exist for the impact of supply chain uncertainty.

To understand when suppliers' recovery efforts work, we integrate justice theory with signaling theory. Widely used in disruption and service recovery studies, justice theory suggests three justice actions (procedural, interactional and distributive) as recovery tools to correct negative events' damage (e.g., Liao, 2007; Smith et al., 1999; Wang et al., 2014). Adopting this theory, our study focuses on the boundary conditions of suppliers' justice actions in the resolution process. As firms are information processors trying to make sense of the world (Daft & Weick, 1984; Thomas et al., 1993), buyers' processing of messages via a supplier-induced negative event and its subsequent recovery shapes buyers' perceptions (Eckerd & Handley, 2015; Eckerd et al., 2013; Reimann et al., 2017a). Following this line of reasoning, we adopt the signaling theory (Connelly et al., 2011a; Spence, 1973). We frame *supplier-induced disruptions* as negative signals suppliers (signalers) send to buyers (receivers), *suppliers' justice actions* as positive signals, and *focal supply chain* as the signaling environment (Connelly et al., 2011a). Furthermore, we use buyers' satisfaction regarding the resolution to assess the effectiveness of suppliers' recovery. We develop competing hypotheses for two moderators—the negative signal's strength (disruption severity) and the uncertainty in the signaling environment (supply chain risk uncertainty[2]). We address whether the two moderators heighten or dampen the positive signals' effectiveness. Then, given three types of the negative signal (quantity shortage, delays, and quality issues), we explore whether some positive signals are more effective than others. Using the critical incident technique (CIT), we collected survey data of two supplier-caused disruptions (one successfully repaired, and one unsuccessfully repaired) from 302 Chinese buying firms.

Our research makes several contributions. While service recovery studies have shown that providers' justice actions improve customers' satisfaction (e.g., del Río-Lanza, Vázquez-Casielles, & Díaz-Martín, 2009; Liao, 2007), we suggest that the signals via suppliers' justice actions are not

[2] *Risk uncertainty* and *uncertainty* are used interchangeably throughout the rest of this chapter.

always "loud and clear"; instead, the messages can sometimes be distorted or less credible. In some cases, suppliers' positive signals can be perceived negatively and hamper buyers' satisfaction (Park & Mezias, 2005). When buyers operate in uncertain supply chains or when disruptions are severe—cases in which buyers prefer flexible procedures (Sheffi & Rice Jr, 2005; Tomlin, 2006) over organized, methodical procedures, too much procedural justice seems to indicate suppliers' inflexibility. Similarly, when disruptions are severe or when buyers' supply chains are stable, interactional justice may indicate suppliers' lack of accountability (use of interactional justice as an impression-management tool to avoid responsibility) (Bolino, Kacmar, Turnley, & Gilstrap, 2008; Greenberg, 1990a) or incapability to work independently. In other cases, suppliers' messages through their recovery can contradict the negative signal by way of the disruption (Balboa and Marti, 2007); thus, those messages can be viewed as less authentic. In resolving disruptions due to delayed deliveries, suppliers' interactional justice that signals their credibility can starkly conflict with the preceding message through delays indicating their inadequate attitudes. Similarly, following disruptions due to quantity shortage, suppliers' procedural justice indicating their capability in contingency planning may contradict the negative signal—incapability in production planning—via shortage. Our study thus provides substantive guidance regarding when suppliers' recovery message is "loud and clear", based on disruption severity, disruption type and supply chain risk uncertainty.

THEORETICAL BACKGROUND AND HYPOTHESES

Signaling Theory

Signaling theory is concerned with the information asymmetry between the signaler (e.g., firm, employee, etc.) and the receiver (e.g., shareholders, consumers, partners, etc.), in which case the signaler is motivated to construct signals to reduce the asymmetry (Spence, 1973, 2002). In a typical signaling process (Connelly et al., 2011a), the signaler sends costly signals to the receiver; the signal often contains information suggesting a specific quality about the signaler that would be otherwise opaque to the receiver; the receiver observes the signal and interprets it, sometimes giving feedback (countersignals). Characterized by uncertainty and unexpectedness (Craighead et al., 2007; Kleindorfer & Saad, 2005), our context—supplier-induced disruption and its recovery—is especially favorable to signaling. Following a disruption (negative signal) induced by a supplier (signaler), the buyer (receiver) seeks information about its supplier's specific quality (e.g., reliability, intention, capability, etc.) by observing the supplier's recovery actions (positive signals); the signaling process occurs in the institutional environment—the buyer's supply chain.

One fundamental assumption of the traditional signaling theory is that the signaler benefits from reduced information asymmetry and, therefore, is willing to invest in signals. In other words, signaling is a strategic action that signalers initiate to reveal their less observable, yet good, qualities. This assumption holds in our context as suppliers benefit from showing their good qualities to buyers through recovery efforts (Craighead et al., 2007; Tomlin, 2006; Wang et al., 2014). Importantly, for signaling to work effectively, signals must be both *observable* and *costly*. The former ensures that the receiver can observe the signal, and the latter ensures that signaling differentiates between high-quality and low-quality signalers to prevent false signals (Lee, 2001).

Scholars have focused mainly on positive signals that signalers intentionally construct to indicate their positive qualities. For instance, firms use costly sustainability initiatives as credible signals demonstrating to shareholders commitment to sustainability (Connelly, Ketchen, & Slater, 2011b) and outsourcing activities as signals to influence their market value (Jiang, Belohlav, & Young, 2007). Suppliers use certified management standards (ISO14001) (Brockhaus, Kersten, & Knemeyer, 2013; King, Lenox, & Terlaak, 2005) and their good reputation (Wagner, Coley, & Lindemann, 2011) as signals demonstrating their credibility to potential buyers. Young firms use alliance information to signal their legitimacy to investors (Gulati & Higgins, 2003). Researchers have questioned if receivers can interpret a positive signal differently, thus resulting in multiple meanings (Park & Mezias, 2005).

Some scholars have called for attention to be paid to negative signals that are not a result of signalers' strategic actions, but that are often a consequence of their wrongdoings (Perkins & Hendry, 2005). In such cases, the signal is still observable and costly (i.e., financial loss due to wrongdoings); and its cost is negatively associated with qualities (e.g., capability) the signaler intends to demonstrate. For instance, when firms have product recalls but fail to effectively handle those recalls, the outcomes can signal the firms' incapability of leveraging resources (Ketchen, Wowak, & Craighead, 2014). While researchers have examined positive and negative signals separately, less attention has been given to the joint effect of signals occurring sequentially to determine whether a negative signal's attributes disturb or enhance the follow-up positive signal(Connelly et al., 2011a).

Signals are transmitted in institutional environments with such characteristics as uncertainty (Ndofor & Levitas, 2004) and resource availability (i.e., munificence) (Park & Mezias, 2005), which further influence the effectiveness of specific signals. For instance, a volatile environment tends to introduce noise into the signaling process and, thus, may diminish certain signals' visibility (Jiang et al., 2007; Zahra & Filatotchev, 2004). How an environmental factor weakens or enhances certain signals' effectiveness is underexplored (Connelly et al., 2011a). In summary, we propose in our conceptual framework how positive signals' effectiveness can be shaped by both the strength of a preceding negative signal and the uncertainty of the signaling environment (illustrated in Figure A-2.1[3]). All figures and tables are presented in the Appendix 2 of Chapter II.

Supplier-caused disruptions as negative signals. We draw attention to the context of supplier-induced disruptions to explore signaling between suppliers (signalers) and their buyers (receivers). As the literature suggests (e.g., Fischer and Reuber 2007; Perkins and Hendry 2005; Ryan et al. 2000), negative signals are often consequences of wrongdoings. When suppliers cause disruptions (e.g., quantity shortages, delayed shipments, quality issues, etc.), buyers can perceive such disruptive events as negative signals, suggesting suppliers' lack of good qualities.

Justice actions as positive signals. In response to supplier-induced disruptions, buyers may question suppliers' qualities that are not directly observable (e.g., expertise, credibility, and integrity) (Wang et al., 2014); thus, these buyers may be very uncertain about focal exchanges

[3] Our model focuses on an immediate relationship outcome—buyers' satisfaction about the resolution process. As the dash-dotted line in our model indicates, studies have shown that satisfaction fosters relationship continuity (Hofer et al., 2012; Wang et al., 2014). To sharpen our focus on what is new, we do not include in our model satisfaction's main effect on continuity. However, a supplementary test of this effect is included in our results section.

with their suppliers. In such cases, a high degree of information asymmetry can exist (Spence, 1973, 2002) between suppliers and buyers. The asymmetry is not ideal for high-quality suppliers because their buyers can develop unfavorable perceptions of the focal exchange and possibly terminate it due to these supplier-induced disruptions, despite the suppliers' high quality. Nor is this asymmetry desirable for buyers because they cannot determine whether the focal suppliers causing the disruption are of low or high quality; thus, they may construct faulty appraisals of the focal exchange and make wrong decisions (e.g., continuing to work with low-quality suppliers but terminating relationships with high-quality ones). Therefore, high-quality suppliers would be motivated to signal their positive attributes (via justice actions) following disruptions, and buyers would be motivated to search for information (or signals) clarifying suppliers' quality. Hence, supplier-induced disruptions serve as appropriate contexts in which buyers more readily receive suppliers' positive signals.

Justice actions consist of the following: *procedural justice,* the perceived fairness of procedures that suppliers employ to resolve a disruption; *interactional justice*, the perceived fairness of interpersonal treatment received during the resolution; and *distributive justice*, the perceived fairness of resources allocated during the resolution. These various forms of justice actions have been increasingly used in supply chain literature to address organizational (Cantor, Macdonald, & Crum, 2011) and inter-organizational issues (Griffith et al., 2006; Hofer, Knemeyer, & Murphy, 2012). In the disruption context, justice has demonstrated its effectiveness in repairing trust damaged during disruptions (Wang et al., 2014). *Procedural justice* refers to the rules of consistency, bias-suppression, accuracy, correctability, representativeness, and ethicality (Leventhal, 1980a). *Interactional justice* refers to the politeness, dignity, and respect demonstrated in suppliers' personal interactions with buyers (Bies & Moag, 1986; Luo, 2007b). *Distributive justice* refers to the rules of equity (Leventhal, 1980a).

Justice actions can be legitimate signals for the following reasons. First, they are observable to buyers. Previous studies have shown that justice actions significantly affect buyers' perceptions of focal relationships (e.g., Hofer et al., 2012; Wang et al., 2014). Second, justice actions to resolve disruptions are costly; the cost should be lower for high-quality suppliers but higher for low-quality suppliers. For instance, to implement well-organized, consistent procedures in order to repair disruption damages, suppliers must invest in human capital to monitor the process (e.g., training, overtime pay) (Craighead et al., 2007) and in quick-response systems to quickly ramp up production (Sheffi & Rice Jr, 2005). Such investment is lower for high-quality suppliers with well-trained employees and possibly flexible manufacturing systems, but is costlier for low-quality suppliers. Likewise, to communicate openly with buyers, suppliers must invest in communication channels (Craighead et al., 2007) and likely have teams dedicated to routine interactions following disruptions. Such investment is also more affordable for high-quality than for low-quality suppliers. Likewise, to show equity, suppliers may have to reimburse part or all of their buyers' loss based on contracts (Reimann et al., 2017a; Wang et al., 2014). This reimbursement is easier for high-quality suppliers who are better endowed than low-quality ones. Overall, the three justice actions are observable to buyers and costly to suppliers; thus, they can legitimately signal suppliers' unobservable qualities (e.g., endowment, capability) to buyers.

Next, we argue that the qualities signaled via suppliers' justice actions in the resolution process can improve buyers' satisfaction. When suppliers adopt consistent and methodical procedures to resolve disruptions in a timely manner, they demonstrate both resilience (Ponomarov & Holcomb, 2009) and capability of addressing challenging situations. When suppliers are polite and respectful during interactions—even in the presence of stressful disruptions, they demonstrate their dignity and considerateness (Wang et al., 2014). As suppliers adopt the equity rule and commit more effort and resources than their buyers to help recover buyers' loss from disruptions (Reimann et al., 2017a), they demonstrate their genuine concern for buyers' welfare, and thus their good intentions (Wang et al., 2014). Furthermore, they signal their capability of making costly commitments. Overall, these positive signals equip buyers with a deeper understanding of the suppliers' true qualities (i.e., capability, reliability, endowment, and good intentions); strengthen buyers' confidence in the relationship; and enhance buyers' satisfaction. Thus,

Hypothesis 1. The use of (a) procedural justice, (b) interactional justice, and (c) distributive justice is positively associated with buyers' satisfaction about the resolution process.

The Moderating Effect of Disruption Severity

The *severity of disruption* refers to the extent of damage the disruption causes (Hartmann & Moeller, 2014). Service recovery studies have showcased severity's critical role in shaping the recovery's success (Craighead et al., 2004; Liao, 2007; e.g., Smith et al., 1999). Likewise, organization behavior studies reveal that a negative event's severity can explain various reactions to the firms' justification actions (Conlon & Murray, 1996; e.g., Shapiro, Raymond, & Arnell, 1994). Because a supplier-induced disruption sends a negative signal, we argue that its severity characterizes the signal's strength (Connelly et al., 2011a; Lampel, Lant, & Shamsie, 2000). The question is whether disruption severity weakens or strengthens justice actions' positive effects on buyers' satisfaction. In other words, in the presence of mixed signals, how does the strength of a preceding negative signal moderate positive signals' effectiveness?

Two lines of reasoning suggest competing hypotheses. The first focuses on a negative signal's priming effect on (1) buyers' perceptions of the focal relationship and on (2) buyers' expectation regarding the level of recovery efforts. In the presence of supplier-induced disruptions, buyers generate unfavorable evaluations of the focal supplier based on the disruptions' impact (Wang et al., 2014). The more severe the impact, the less likely buyers will positively evaluate the supplier and its behaviors. Thus, negative signals in the form of severe disruptions prime buyers with negative appraisals of the focal relationship (Hartmann & Moeller, 2014), creating unfavorable shadow of the past (Poppo et al., 2008). Even when suppliers follow up with justice actions to signal their positive attributes, suppliers may be unable to dispel buyers' negative perception of them. In this case, these positive signals' effectiveness may be overshadowed by the negativity resulting from severe disruptions. In contrast, when disruptions are less severe, they have less impact on buyers' appraisal of the relationship; the following positive signals may then become dominant factors affecting buyers' evaluations. Thus, in terms of influencing buyers' satisfaction, the strong negativity from more severe disruptions offsets the positivity from justice actions.

Furthermore, as service recovery research indicate, a negative event serves as a reference point from which customers evaluate recovery (Smith et al., 1999). Based on the equity expectation, customers would like to regain what has been lost from a negative event (Adams, 1965). Thus, just

as the negative event's severity shapes one's estimation of the resulting loss, it can increase one's expected recovery level; the higher the severity, the greater the discrepancy between estimated loss and expected recovery (Liao, 2007). As buyers face more severe disruptions, they raise their desired level of suppliers' recovery efforts. Therefore, for a given level of suppliers' recovery, buyers experiencing more severe disruptions may feel that suppliers' efforts are less adequate than those experiencing less severe disruptions (Conlon & Murray, 1996; Liao, 2007). Hence,

Hypothesis 2. Disruption severity negatively moderates the positive associations between (a) procedural justice, (b) interactional justice, (c) distributive justice and buyers' satisfaction.

The second line of reasoning suggests an opposite effect—a strong signal's channeling effect on the subsequent signaling process. If there is a series of signals about an encounter, previous signals may direct attention to the specific encounter and, thus, the subsequent signals. This reasoning is aligned with the attention-based view of firms (Ocasio, 1997), arguing that situational stimuli, especially the unexpected (e.g., a disruption event), can draw decision-makers' attention and trigger their controlled information processing of the event (Shiffrin & Schneider, 1977). We expect that the stronger a preceding signal is (i.e., the more severe the disruption), the more salient the disruption appears (Eckerd et al., 2013) and the more attention the buyer pays to suppliers' follow-up signals conveyed through recovery actions.

As some signaling studies suggest, the effectiveness of positive signals depends on how much attention the buyer gives to the signals (Gulati & Higgins, 2003). This reasoning is particularly relevant as buyers in modern supply chains may be surrounded by many signals sent from the supply base (Hult et al., 2004). Thus, when a severe supplier-induced disruption occurs, buyers begin closely monitoring the suppliers' actions in the resolution process (Craighead et al., 2007). As suppliers use justice actions to effectively address the disruption, buyers who have paid attention to these suppliers more readily receive the positive signals (Gulati & Higgins, 2003). Thus, working as active information processors continually scanning and making sense of the new information (Daft & Weick, 1984; Thomas et al., 1993), buyers act on this updated information via positive signals and become more satisfied. As a result, the effectiveness of these justice actions can be more salient. In contrast, when a less severe disruption occurs, buyers may be less aware of the event. Given the small impact on buyers' operations, buyers may pay less attention to the suppliers' follow-up actions such that the positive signals conveyed through justice actions may be less noticed. Hence,

Hypothesis 2'. Disruption severity positively moderates the positive associations between (a) procedural justice, (b) interactional justice, (c) distributive justice and buyers' satisfaction.

The Moderating Effect of Supply Chain Risk's Uncertainty

The institutional environment in which a disruption occurs can also shape the effectiveness of suppliers' positive signals (Connelly et al., 2011a). As disruptions and their recovery occur in buyers' supply chains, buyers' supply chains can be one such environment. We focus on *supply chain risk uncertainty,* defined as the exogenous uncertainties that reside outside the buying firm (Hult, Craighead, & Ketchen, 2010). The question is whether supply chain uncertainty weakens or enhances the effectiveness of justice actions as positive signals on buyer satisfaction.

We propose two lines of reasoning leading to competing hypotheses. The first centers on the dynamic information characterizing an uncertain supply chain and hindering the signaling (Jiang et al., 2007; Zahra & Filatotchev, 2004). Buyers in a volatile, versus a stable, environment often deal with rapidly-changing information (Leblebici & Salancik, 1981; Luo, 2007a); at the same time, these buyers can be inundated by enormous amounts of information from their complex supply bases (Craighead et al., 2007). For instance, comparing buyers operating in the fashion industry with those in the automobile industry, the former group faces constantly shifting market demands and operational updates from their suppliers, whereas the latter group has a more stable flow of information from both upstream and downstream. In the former case, more signals can be competing for buyers' attention than in the latter case. As buyers are constrained by their attention capacity (Ocasio, 1997) and information-processing capacity (Egelhoff, 1982; Srinivasan & Swink, 2015), it is more difficult for those in the former group to pay attention to a signal from their suppliers than their counterparts in the latter group. Likewise, buyers in the former group may experience other disruptions occurring with the focal one; thus, their attention is distracted by these events (Ocasio, 1997).Therefore, signals in the form of justice actions from the focal supplier may be disrupted by signals from other suppliers competing for the buyers' attention (Connelly et al., 2011a).

Furthermore, buyers in an uncertain supply chain—compared to those in more stable environments—have probably dealt with more disruptions in the past (Hult et al., 2010). As they experience more disruptive events, their information-processing of disruptions becomes more automatic and less controlled; when governed by such automatic processing, they pay less attention to the focal disruption (Shiffrin & Schneider, 1977). As buyers' attention is essential for effective signaling (Gulati & Higgins, 2003), the effectiveness of suppliers' positive signals through their recovery efforts diminishes. Hence,

Hypothesis 3. Buyers' supply chain risk uncertainty negatively moderates the positive associations between (a) procedural justice, (b) interactional justice. (c) distributive justice and buyers' satisfaction.

In contrast, the second reasoning focuses on the perspective that buyers proactively act on and shape their environment, as opposed to merely reacting to it (e.g., Hambrick, 1982; Sirmon, Hitt, & Ireland, 2007). A complex and dynamic task environment is characterized by uncertain supply chains (Choi & Krause, 2006). Being aware of these characteristics, buyers are more motivated to simplify their decision-making by seeking outside signals to gather more information (Higgins & Gulati, 2006). In other words, the risk uncertainty in buyers' supply chains causes buyers to be increasingly attuned to signals (Sanders & Boivie, 2004) via suppliers' recovery efforts. Furthermore, the information contained in suppliers' positive signals provides buyers unique value—indicating suppliers' less observable attributes (Ndofor & Levitas, 2004) that can be leveraged to inform buyers' decisions about the recovery and the focal exchange. Hence, buyers more readily receive and value suppliers' recovery efforts. In contrast, when buyers operate in stable supply chains, information asymmetry may already be low between buyers and suppliers. Thus, these buyers rarely need extra information unveiling suppliers' attributes to facilitate decision-making. As uncertainty in buyers' supply chains increases, buyers anticipate more value

from suppliers' signals and grow more attuned to those signals; thus, the effectiveness of suppliers' signals are amplified.

Furthermore, buyers recognizing their task environment's complexity (Choi & Krause, 2006) may realize that their suppliers (like themselves) have less control over the environment (Ford, 1985a); thus, buyers acknowledge suppliers' difficulty in operating smoothly and reliably. With such awareness, buyers are more likely to justify supplier-induced disruptions by attributing (with or without bias) these events to less controllable factors (e.g., suppliers' endowment) and then develop less negative perceptions of suppliers (Eckerd & Handley, 2015; Hartmann & Moeller, 2014). These perceptions may be carried throughout the recovery process and inflate the buyers' appraisal of the recovery. In addition, buyers may lower their expectation for a successful recovery because they are aware of the related challenges in an uncertain and complex supply chain (Craighead et al., 2007). Given a certain level of suppliers' recovery efforts, buyers with lower expectations as their reference point for evaluation are more likely to feel more satisfied than those with higher expectations (Oliver, 1980). Hence,

Hypothesis 3'. Buyers' supply chain risk uncertainty positively moderates the positive associations between (a) procedural justice, (b) interactional justice, (c) distributive justice and buyers' satisfaction.

RESEARCH METHOD

Sampling and Data Collection

To test our conceptual framework—how disruption severity and supply chain uncertainty moderate the positive impact of suppliers' justice actions on buyers' satisfaction, we collected data from Chinese manufacturing firms regarding supplier-induced disruption events. To select our sample firms, we used the directory provided by the China Statistic Bureau. We randomly selected 1000 manufacturing firms with the four-digit Chinese Industrial Classification (CIC) codes ranging between 1311 and 4290 as our final list.

Following Hoskisson et al.'s (2000) procedure, we developed our survey in English and had it translated into Chinese and then back into English by individual translators. In the first half of 2011, we pilot-tested our survey with 37 US and 31 Chinese senior purchasing managers. In the second half of 2011, we started our data collection with face-to-face interviews. The interview technique was chosen to increase the participation and completion rates. To solicit participation, experienced interviewers contacted the 1000 firms by telephone. These interviewers had more than 20 hours of interview training and had conducted more than two similar interviews. During this initial contact, firms were informed of our research study and of their responses' confidentiality. Among the 1000 firms, 436 agreed (orally) to participate, provided our study's key informants, and verified the interview locations. Some of the respondents who agreed to participate could not complete the survey because of unexpected scheduling conflicts. We eventually obtained 302 interview responses—a 69% response rate.

Driven by our research question, we aimed to capture disruption' attributes (such as severity) and the buyers' experience (such as perceived fairness) with the suppliers' resolution process.

Thus, we implemented the critical incident technique (CIT) (Flanagan, 1954) to collect data. CIT is a useful tool, which taps into characteristics of and respondents' experiences in a critical (positive or negative) incident (Gremler, 2004) and which has been successfully used in service marketing and recovery literature (e.g., Bitner, Booms, & Tetreault, 1990; Craighead et al., 2004; Miller, Craighead, & Karwan, 2000). We asked respondents to recall two disruption events (one successfully resolved and one unresolved) that were induced by two important suppliers in the past two years, and to use the events as reference points for their responses. Because we expected respondents to be knowledgeable about the disruptions, the resolution processes, and their firms' relationship with the involved suppliers, we chose senior purchasing executives as our key informants. Each interview lasted approximately one hour. We cross-validated a random subsample of our survey responses (20%) with our respondents via telephone and checked the survey-response patterns to ensure that respondents paid attention. Table A-2.1 provides the sample profile of 302 buying firms.

Common Method Bias

Because we used a single-respondent survey to capture all the variables, common method variance—a spurious correlation arising from using the same method to measure the independent and dependent variables within a relationship—had to be carefully addressed to ensure our results' validity (Craighead, Ketchen, Dunn, & Hult, 2011). Following Podsakoff et al. (2003), we implemented several remedies for common method bias. In terms of procedural remedies, we guaranteed respondents' anonymity, separated items of predictors and outcome variables, and improved scale clarity by pilot tests. We then conducted three statistical remedies. First, we conducted Harman's one-factor test, which has been widely used (Craighead et al., 2011). We loaded all items onto a single factor in a confirmatory factor analysis (CFA) setting and compared this single-factor model's fit with our measurement model using a chi-square difference test. Our measurement model had a significantly better fit ($p < 0.001$). Second, we conducted the marker variable technique (Richardson, Simmering, & Sturman, 2009). We added to our CFA measurement model a single-item variable—i.e., respondents' job satisfaction (theoretically unrelated to severity before resolution). The correlation between job satisfaction and severity before resolution was non-significant ($r = 0.05$, $p = 0.17$), indicating that common method variance is less of a concern in our study. Third, we added a latent common method factor to our measurement model; we allowed all scale items loading onto this factor and their corresponding theoretical constructs (Netemeyer, Boles, McKee, & McMurrian, 1997). The items' factor loadings onto theoretical constructs remained significant ($p < 0.001$), confirming that common method bias was not a concern.

Measure Development and Assessment

Following the CIT approach, we designed a two-part survey with each part corresponding to a supplier-induced disruption (occurring in the previous two years) that the respondents identified—one successfully and the other unsuccessfully resolved. We directed respondents to use each of the two disruptions and the corresponding experiences as their reference point for each part of the survey. A seven-point Likert scale and open-ended questions were included. The survey instruments are presented in Table A-2.2.

We assessed *procedural justice, interactional justice, and distributive justice* in the disruption resolution process by asking the extent to which respondents agreed with each of the justice items as they evaluated the resolution process. Procedural justice was measured with five items based on the rules outlined by Leventhal (1980a) and Thibaut and Walker (1975). Interactional justice was measured with eight items based on the rules outlined by Bies and Moag (1986). Distributive justice was measured with five items based on the rules outlined by Colquitt and Rodell (2011).

We assessed *severity of disruption before resolution* by gauging respondents' agreement with each of the severity items regarding the disruption's negative impact on the firm's before the resolution was conducted. A six-item scale was developed that tapped into the disruption's negative impact on the firm's overall performance, internal operations, supply chain operations, dollar loss, customer satisfaction, and overall competitiveness.

We assessed *supply chain risk uncertainty*—the extent to which the firm faced external risks, problems and obstacles—with a three-item scale adopted from Hult, Craighead, and Ketchen (2010).

Using a five-item scale developed for this study, we measured *satisfaction about the resolution process*—the extent to which the firm was satisfied with the supplier's resolution process. We confirmed this measure's content validity with our pilot participants.

We included five sets of control variables. Regarding suppliers, we controlled for each supplier's country. Regarding buyers, we controlled for each buyer's industry, country, performance, size (measured by sales), and age. Regarding relationship, we controlled for relationship age, supplier dependence, and frequency of contacts. Regarding respondents, we controlled for each respondent's purchasing experience. Regarding disruption events, we controlled for supplier compensation and disruption severity after resolution. By controlling these factors, we tried to eliminate some alternative explanations and reduced errors in the analytical models (Greene, 2012), improving our estimation's efficiency. We have provided correlations among and descriptive statistics of all constructs in Table A.3.

To assess our measurement model's convergent and discriminant validity, we conducted confirmatory factor analysis (CFA) on our multi-item measures using MPLUS 7.2. We included procedural justice, interactional justice, distributive justice, severity of disruption before/after resolution, supply chain risk uncertainty, satisfaction with the resolution process, supplier dependence, and buyer performance. The results provided a good model fit ($\chi 2 = 2391.76$, df = 783, CFI = 0.91, TLI = 0.90, RMSEA = 0.06, SRMR = 0.05). All the items' standardized coefficients were highly significant ($p < 0.001$), indicating the constructs' convergent validity (see Appendix). The constructs' composite reliability (CR) ranged between 0.80 and 0.94, and the constructs' average variance estimated (AVE) ranged between 0.51 and 0.76; both measures indicated good reliability (see Table A-2.3).

To ensure the justice constructs' discriminant validity (Venkatraman, 1989), we compared the unconstrained model with the constrained models in which the correlations between any two of the three justice constructs were set to one. If the unconstrained model's fit is significantly better

than that of the constrained models, the discriminant validity test is deemed satisfied. The tests indicated our constructs' discriminant validity (see Table A-2.4).

Model Specification and Estimation

We collected data about two distinct disruptions and the corresponding resolution processes from each of the respondents from the 302 responding firms. Thus, our data were structured in three nested levels: data of individual disruptions (e.g., severity, supplier compensation), individual resolutions (e.g., supplier's justice actions), and relationship attributes (e.g., relationship age) were nested with the respondent. The respondents' data (e.g., purchasing experience) were nested within the buying firm. Data from the same level (i.e., cluster) might be interdependent due to unobserved factors (e.g., culture, capability, etc.). Traditional regression approaches (such as ordinary linear squares) cannot account for such interdependence within the same cluster and may provide biased estimates (Greene, 2012). Thus, we used the hierarchical linear model (HLM), a modeling approach that explicitly accounts for data interdependence within clusters, to test hypotheses (Raudenbush & Bryk, 2002). We used the full maximum likelihood estimation, allowing us to conduct a fit comparison across nested models. Based on HLM's strict assumption on normality (Raudenbush & Bryk, 2002), we logged transformed non-normal variables: buyer size, age, relationship age, frequency of contacts, and respondents' purchasing experience.

To test H1, we estimated a main effect model by regressing buyers' satisfaction onto three justice actions (Level 1), severity of disruption before resolution (Level 1), supply chain risk uncertainty (Level 2), and controls. To test moderations as hypothesized in H2/H2', we added to the main effect model the severity's interaction effects with each of the three justice variables. Likewise, to test moderations as of H3/H3', we added to the main effect model the interaction effects of supply chain risk uncertainty with each of the three justice variables. As our main interests centered on both within-level (H2/H2') and cross-level interactions (H3/H3'), we mean-centered all variables by clusters (i.e., cluster-mean centering) instead of centering at the grand mean to ensure unbiased estimates[4] (Enders & Tofighi, 2007; Raudenbush, 1989).

RESULTS

Main Analyses

Results of our main analyses are presented in Table A-2.5. First, the main effects of procedural justice ($B = 0.39$, $p < 0.001$) and distributive justice ($B = 0.23$, $p < 0.001$) on buyers' satisfaction were significant while interactional justice's main effect was non-significant ($B = -0.06$, $p = 0.39$) (Model 1). Thus, we found support for H1(a) and H1(c). Next, we assessed H2/H2' (Model 2). Among the disruption severity's interactions with three justice actions, none was significant. We then assessed H3/H3' (Model 3) and found that buyers' supply chain uncertainty negatively moderated procedural justice's main effect on buyers' satisfaction ($B = -0.15$, $p < 0.001$), whereas it positively moderated the effects of interactional justice ($B = .11$, $p = .05$) and distributive justice ($B = 0.09$, $p = 0.06$) on buyers' satisfaction. Thus. H3(a), H3'(b) and H3(c) were supported.

[4] For Level 2 factors, cluster-mean centering and grand-mean centering are mathematically the same.

Supplementary Analyses

We conducted four sets of supplementary analyses. Our findings that severity failed to moderate any of the justice actions deserved further exploration. We wondered if the justice actions' main effects might be quadratic and, thus, if the moderations' null effects were due to a mis specified linear function form of the main and the interaction effects. Therefore, we conducted the first set of supplementary analyses (results shown in Table A-2.6) following Haans, Pieters and He (2015). As a first step, we added quadratic terms of three justice variables and explored whether there were curvilinear effects between justice actions and buyers' satisfaction (Model 4). We found an inverted U-shaped relation between procedural justice and satisfaction (quadratic term: $B = -0.16$, $p = 0.04$); linear term: $B = 0.39$, $p < 0.001$). The curve's turning point was 0.72 (at the 86th percentile). This finding suggested that as procedural justice increased, buyers' satisfaction increased up to a certain point; beyond that point, buyers' satisfaction declined. Figure A-2.2 illustrates procedural justice's curvilinear effect on buyers' satisfaction. We found a linear relation between distributive justice and satisfaction (quadratic term: $B = -0.09$, $p = 0.30$; linear term: $B = 0.23$, $p < 0.001$) *and* a non-significant effect of interactional justice.

To test moderation of the quadratic effect, we interacted disruption severity with both the linear and quadratic terms of procedural justice (Haans et al., 2015). For distributive and interactional justice, we interacted severity with only the linear terms. Regarding severity, our results (Model 5) show that severity moderated procedural justice's curvilinear effect in that the curve was steeper when disruptions were highly severe as compared to when disruptions were less severe (quadratic term $B = -0.20$, $p < 0.001$; linear term: $B = -0.04$, $p = 0.81$). In other words, as severity increased, procedural justice's dark side was more substantial. Also, severity positively moderated distributive justice's linear effect on satisfaction ($B = 0.38$, $p = 0.08$). Figures A-2.3 and Figure A-2.4 illustrate severity's moderating effect on procedural justice and distributive justice, respectively. Interestingly, although interactional justice's main effect was non-significant, its interaction with severity was marginally significant and negative ($B = -0.38$, $p = .09$).

We conducted the same procedure for interactions with supply chain risk uncertainty. Our results (Model 6) demonstrated that uncertainty significantly moderated the curvilinear effect of procedural justice (quadratic term: $B = -0.14$, $p < 0.001$; linear term: $B = -0.15$, $p < 0.001$). Under low uncertainty, procedural justice improved satisfaction at a diminishing rate. The turning point was 2 (at the 99th percentile). Under high uncertainty, there was an inverted U relationship between procedural justice and satisfaction. The curve's turning point was 0.16 (at the 64th percentile). As for distributive justice, supply chain uncertainty positively strengthened its linear effect on satisfaction. Figures A-2.5 and Figure A-2.6 illustrate the moderating effects of supply chain risk uncertainty on both procedural and distributive justice, respectively. Notably, the interaction between supply chain uncertainty and interactional justice was significant and positive ($B = 0.11$, $p = 0.06$), albeit interactional justice's non-significant main effect.

Our second set of supplementary analyses centered on the fact that the interaction terms of severity/uncertainty with interactional justice were significant, while interactional justice's main effect was not (as shown by Models 5 and 6). We speculated whether interactional justice might be effective in some scenarios (as categorized by severity and uncertainty) but ineffective (or even counterproductive) in others. To address this question, we first split our sample into groups of high

severity (N = 253) and low severity (N = 302) based on the mean of severity. We separately reevaluated the justice variables' main effects for two groups using HLM. The results showed that for the high severity group, there was a significant negative association between interactional justice and buyers' satisfaction (B = -0.28, p = 0.09); for the low severity group, interactional justice did not significantly affect buyers' satisfaction (B = 0.12, p = 0.31). Next, we split the sample into groups of high uncertainty (N = 332) and low uncertainty (N = 272) based on the mean of supply chain risk's uncertainty and reassessed justice's effects for the two groups. For the high uncertainty group, interactional justice did not have a significant impact (B = 0.15, p = 0.13); for the low uncertainty group, interactional justice had a significant negative effect on buyers' satisfaction (B = -0.23, p = 0.06). As a robustness check, we used medians of severity and uncertainty to split the sample and then reassessed the models; the results were consistent with mean-splitting. Table A-2.7 and Table A-2.8 summarize the results for groups of high versus low severity and for groups of high versus low supply chain uncertainty.

While our main analysis centered on the moderating effect of a negative signal's strength, our third set of supplementary analyses focused on the moderating impact of a negative signal's type—disruption type—on justice actions. In our survey, we asked respondents to describe the disruptions they recalled. One author manually coded the disruption type based on the provided description. To ensure the coding's reliability, a second author randomly selected 60 cases and recoded the cases independently. The interrater agreement as measured by Cohen's Kappa coefficient (Cohen, 1960) was 0.93, indicating good reliability. We categorized disruptions into three types: disruptions due to quantity shortage (N = 225), delayed shipments (N = 311), and quality issues (N = 68). Based on the disruption type, we split the sample into three groups and evaluated the three justice variables' main effects for the three groups. We found that justice's effectiveness varied across disruption types (results summarized in Table A-2.9). When the disruption was due to quantity shortage (Model T1), only distributive justice seemed to be effective (B = 1.14, $p < 0.001$); interestingly, procedural justice negatively affected buyers' satisfaction (B = -0.70, p = 0.05); and interactional justice did not have a significant impact. When the disruption was due to delayed shipments (Model T2), both procedural justice (B = 0.65, $p < 0.001$) and distributive justice (B = 0.15, p = 0.07) would work; but the former approach was more effective than the latter; in contrast, interactional justice seemed to be counterproductive in shaping buyers' satisfaction (B = -0.21, p = 0.04). When the disruption was due to quality issues, none of the three justice actions effectively shaped buyers' satisfaction.

The fourth set of supplementary analyses demonstrated that the outcome in our model (i.e., buyers' satisfaction about the resolution process) could have a tangible impact on buyers' decisions about the focal relationship (i.e., buyers' continuity intentions). In our survey, we measured buyers' continuity intention with three items on a seven-point Likert scale (adapted from Wang et al., 2010). The construct had a Cronbach alpha of 0.91, suggesting good reliability. We used buyers' continuity as the dependent variable and added buyers' satisfaction as an independent variable along with the predictors we included in Models 1-6 (Tables A-2.5 and Table A-2.6). The results showed that buyer satisfaction was positively associated with buyer continuity across all six models (satisfaction's coefficient estimate ranged between 0.41 and 0.44 with $p < 0.001$), suggesting that our outcome variable (i.e. buyers' satisfaction) could affect buyers' behaviors.

Robustness Checks

Endogeneity poses a threat to survey research and may arise from multiple sources (Bascle, 2008). One source—plausibly the most common one (Ketokivi & McIntosh, 2017)—is omitted variables (i.e. alternative explanations) that account for both independent and outcome variables (Bascle, 2008; Wooldridge, 2010). Notably, our model included a deliberate set of control variables at different levels (suppliers, buyers, relationships, and respondents), accounting for some alternative explanations. In addition, we identified other alternative explanations and addressed this issue as follows. First, the degree to which the supplier directly caused the disruption might explain the level of its justice efforts (Vaidyanathan & Aggarwal, 2003), whereas it might also influence buyer satisfaction (Hartmann & Moeller, 2014). We measured this variable by asking respondents the extent to which they agreed that the disruption was "caused by the supplier" on a seven-point Likert scale; we included this variable as a control and reevaluated our models. Results remained consistent. Second, whether the supplier previously caused disruptions might affect the supplier's capability of implementing justice actions (Ponomarov & Holcomb, 2009) and might also shape buyers' expectation about the supplier's resolution (Smith & Bolton, 1998). We gauged the respondents' agreement with the fact that "this supplier caused other disruptions prior to this disruption" on a seven-point Likert scale; we added this variable and reassessed our models. Results remained the same. Third, the supplier's criticality to the buyer (implying resource dependence) could potentially dictate the level of the supplier's justice efforts and impact the buyer's appraisal of the supplier's performance in the resolution process (Bode et al., 2011). We measured the percentage of the buyer's purchase that was accounted for by the focal supplier's products (interval-coded: <$10,000 (1), $10,000-49,9999 (2), $50,000- $99,9999 (3), $100,000-$499,9999 (4), $500,000 or more (5)). The larger the percentage, the more critical the supplier was to the focal buyer. We included this variable and reran the models. Estimates were consistent.

Another source of endogeneity is reverse causality (i.e., independent variables resulting from outcome variables) (Bascle, 2008; Wooldridge, 2010). Our design helped alleviate this concern. First, independent variables captured suppliers' recovery efforts, and the outcome variable captured buyers' perception about the recovery. Logically, buyers would be unable to appraise the recovery without suppliers' recovery efforts. If reverse causality existed, a necessary condition would be that buyers' appraisal of recovery preceded suppliers' recovery (Hunt, 1991), a condition that logically would not stand. Along the same line, our moderator—the disruption's severity *before* resolution—was framed as a precedent to our outcome variable—satisfaction about the resolution. Thus, our outcome variable would be less likely to cause this moderator. Second, our other moderator—supply chain risk uncertainty—was an exogenous variable measuring buyers' external risks (Hult et al., 2010) and, therefore, is less likely to suffer reverse causality.

The third source of concern is error-in-variables if correlated with independent variables (Bascle, 2008). Our design could ease this concern as follows. First, we addressed in a previous section common method bias—one of the most common systematic errors (Craighead et al., 2011). Second, our multi-item constructs demonstrated good reliability, suggesting lower measurement errors. Despite all these efforts, we acknowledge that eliminating endogeneity in our study was impossible.

DISCUSSION

Implications

To develop a more nuanced understanding of when suppliers' justice actions can be effective in the wake of supplier-induced disruptions, we complement justice theory with signaling theory. Specifically, we frame suppliers' justice actions in the resolution process as positive signals informing buyers of suppliers' unobservable qualities, ultimately shaping buyers' satisfaction and continuity intentions. More importantly, we leverage insights from signaling theory and identify boundary conditions (Goldsby et al., 2013) (i.e., a negative signal's strength, a negative signal's type, and uncertainty in the signaling environment) by which positive signals are more or less effective (or even detrimental).

Our results reveal several interesting insights. First, as Park and Mezias (2005) suggest, one signal can have multiple meanings. Echoing this point, we show that justice actions—seemingly positive signals—in some cases can deliver negative messages. For instance, we find that too much procedural justice can be counterproductive, especially when buyers' supply chains have high uncertainty and when disruptions are severe. A plausible explanation is that buyers operating in uncertain supply chains face rapid changes (Hult et al., 2010), so they may prefer a more flexible and responsive resolution procedure (Tomlin, 2006) as opposed to an organized and methodical one. Likewise, buyers facing severe disruptions may have to deal with a wider range of affected facilities and operations and, thus, need flexible procedures to ensure recovery plans across these facilities are coordinated and well adjusted (Sheffi & Rice Jr, 2005). In both cases, too much procedural justice imposes rigidity on the disruption's repair; instead of a positive signal, it can indicate suppliers' lack of flexibility and harm buyers' satisfaction.

Likewise, interactional justice can send negative messages when disruptions are severe and when buyers' supply chains have little uncertainty. In the former case, buyers and suppliers may have enough on their plate given the magnitude and complexity of resolving severe disruptions (Craighead et al., 2007). Thus, buyers may expect suppliers to commit all their resources to the tangible—rather than the psychological/social—aspect of the recovery. Buyers may even perceive suppliers focusing on interactional justice as conducting impression management (Bolino et al., 2008; Greenberg, 1990a) to avoid actual responsibility for the disruption, thus the buyers would be less satisfied. In the latter case of stable supply chains in which recovery is less unpredictable, buyers may perceive frequent interactions as unnecessary; thus, the high interactional justice of suppliers may imply that they are (1) incapable of responding independently (i.e., lacking recovery capabilities) (Craighead et al., 2007), or (2) expecting buyers to share more responsibility (i.e., lacking ownership of the issue) (Reimann et al., 2017a).

Second, signaling research has identified two attributes for a signal to be credible: costly and observable (Connelly et al., 2011a). However, we suggest there may be a third criterion—the focal signal must deliver messages consistent with preceding ones; otherwise, its credibility may be questioned (Balboa and Marti, 2007). Our results suggest two such cases. The first is related to suppliers' interactional justice when disruptions are due to delayed deliveries. Their interactional justice—aimed to convey their concerns (Wang et al., 2014)—can conflict with the message of lacking accountability as indicated by the delay; this conflict may increase buyers' suspicion about

the credibility of suppliers' actions. A similar case occurs when suppliers use procedural justice in resolving disruptions resulting from insufficient quantities. Buyers may initially attribute the shortage to suppliers' incapability of capacity/material planning. As suppliers arrange methodical procedures in the resolution, they emit a signal in stark contrast with the buyers' initial attribution. Buyers may start to wonder whether the shortages are due to suppliers' inadequate attitudes instead of incompetence, and thus become dissatisfied (Eckerd & Handley, 2015).

Third, although studies have identified tangible versus psychological recovery actions (Craighead et al., 2004; Miller et al., 2000; Reimann et al., 2017a), less is known about their relative effectiveness. Our findings that interactional justice generally does not affect buyers' satisfaction (as much as procedural or distributive justice) provide insight into this issue—buyers are seemingly more attuned to signals that speak to the tangible side of the repair (i.e., quick handling and compensation) as opposed to the psychological (i.e., apologies and courteous interactions) (Reimann et al., 2017a). Distributive justice—the most tangible form of justice—seems to be consistently effective across various scenarios; i.e., suppliers can always rely on the rule of equity in resolving disruptions.

Signaling studies have mainly investigated a single signal's implication (e.g., Connelly et al., 2011b; King et al., 2005; Wagner et al., 2011). However, those studies have overlooked the joint effect of a combination or series of signals—specifically, how one signal's impact varies based on preceding signals' attributes (Spence, 2002). For instance, theory is not clear about the role of the a preceding signal's strength in shaping following signals. On the one hand, a more severe supplier-induced disruption would prime buyers with negative impressions of the focal supplier (Liao, 2007; Wang et al., 2014), thus dampening the positive effects of follow-up justice actions. We find this argument works only for procedural justice, suggesting that procedural justice's effectiveness can be easily weakened if it follows a strong negative signal. On the other hand, a more severe disruption can draw buyers' attention to the focal event; therefore, suppliers' follow-up actions as positive signals can be more readily received (Gulati & Higgins, 2003). We find support indicating that distributive justice can be more beneficial if the preceding signal (albeit negative) is stronger. Thus, we contribute to signaling theory by clarifying that the shaping effect (amplifying or dampening) of a negative signal's strength can differ across positive signals. We recommend that suppliers evaluate disruption severity before committing resources to specific actions. When severity is low, procedural justice can be especially effective, though distributive justice also works. When severity is high, suppliers can leverage disruptions as opportunities (Sheffi & Rice Jr, 2005; Wang et al., 2014) to enhance relationship outcomes by adopting equity rules in recovery whereas avoid too much procedural justice.

Similarly, theory has been inconclusive about the moderating impact of an uncertain signaling environment on shaping positive signals' effects (Connelly et al., 2011a). On the one hand, buyers in an uncertain environment face many rapidly-shifting signals from their supply base (Choi & Krause, 2006); thus, the focal supplier's signals can be barely noticeable. We find that procedural justice fits in this case, implying that it sends messages easily overshadowed by other signals. On the other hand, uncertainty can propel buyers to be more attuned to signals and, thus, readier to search for those from suppliers to reduce information asymmetry (Higgins & Gulati, 2006). We find that distributive justice fits in this case, suggesting that it is a signal buyers proactively search

for in a noisy environment. In general, the signaling environment's impact can be complex, depending on different signals. We recommend that suppliers develop a fuller understanding of the institutional environment in which their buyers operate, thus making better-informed decisions about strategies. When buyers operate in dynamic supply chains, both procedural and distributive justice can be beneficial; however, distributive justice should be the focus. When buyers operate in stable supply chains, procedural justice is effective while distributive justice is less so.

Finally, we explore how the impact of positive signals hinges on different types of negative signal. Consistent with the insights from the service recovery literature that justice actions should cater to specific service failures (Smith et al., 1999), our results indicate that disruption type is another critical factor suppliers should consider in the recovery. With information about disruption types readily available, it should be low-hanging fruit for suppliers to ensure recovery's effectiveness. When disruptions are due to quantity shortage, distributive justice works, whereas the other two types of justice do not. For instance, the supplier should compensate for the quantity shortfall and even reimburse part (if not all) of the financial loss the buyer suffers from the disruption in order to secure future business. When disruptions are due to delayed shipments, both procedural and distributive justice would work, but procedural justice should be the priority. The supplier can first establish methodical plans to expedite delayed shipments, to notify buyers with tracking information, and to coordinate with buyers to ensure smooth inbound operations. Next, the supplier can follow the rule of equity and consider covering the premiums of expedited shipping. When disruptions are due to defective products, none of the justice actions work. Buyers probably consider quality a basic requirement, so quality-related disruptions may seriously impair the reputation of suppliers and even render them unqualified; in this case, recovery actions cannot easily overturn buyers' evaluations.

Limitations and Future Research

Future research can use longitudinal designs, such as a multi-stage experiment, to assess our results' causality (i.e., whether justice action leads to increased buyer satisfaction) and longer-term relationship outcomes (i.e., whether justice's impact on buyers' satisfaction feeds into repeated future interactions). In addition, future research can integrate other theories with signaling theory in the disruption context to address alternative strategies suppliers can take in the presence of quality-related disruptions. Relatedly, our study has demonstrated the viability of signaling theory in the disruption context, and we encourage future research to explore other boundary conditions (Goldsby et al., 2013) shaping the effectiveness of positive signals such as the attributes of signalers (e.g., credibility) and of receivers (e.g., learning organization). Also, we call for more use of signaling theory in related supply chain contexts (e.g., product recalls, ethical supply chains) where information asymmetry is prevalent. Finally, it would be interesting to move towards multi-tier supply chains beyond our dyadic setting—for example, do the effectiveness and visibility of signals diminish as the number of tiers between the signaler and the receiver increases, and would the direction of signaling (upstream to downstream *versus* downstream to upstream) matter?

APPENDIX 2

Table A-2.1: Sample Profile of Buying Firms

	Buying Firms	
Sales in RMB (in millions)	**Frequency**	**Cumulative%**
0–10	48	15.89
11–50	171	72.52
51–100	30	82.45
101–500	46	97.68
501–1000	5	99.34
>1000	2	100
	302	
Number of employees		
0–50	27	8.94
51–100	85	37.09
101–200	107	72.52
201–500	52	89.74
501–1000	13	94.04
1001–2000	8	96.69
2001–5000	5	98.34
>5000	5	100
	302	
Age		
0–5	15	4.97
6–10	97	37.09
11–15	119	76.49
16–20	41	90.07
21–25	15	95.03
26–30	2	95.70
31–50	8	98.34
>50	5	100
	302	
Industry		
computer, communications, and electronic equipment	55	18.21
clothing	40	31.46
special equipment	29	41.06
Others	178	100
	302	

Table A-2.2: Survey Instruments and Confirmatory Factor Analysis

Survey instruments			
Open-ended question "Please recall one major disruption event which involved your firm and one specific supplier and occurred in the past 2 years. Please briefly describe the major disruption. [By disruption, we mean the delay of the unavailability of materials from suppliers, leading to a shortage of inputs that could paralyze the business activity of your company.]"			
Multi-item Scale	**Standard coefficient**	**Standard error**	**t-value[a]**
Procedural justice (Wang et al., 2014)**:** disruption resolution process was			
appropriate	.81	.02	49.47
timely	.84	.01	58.36
efficient	.87	.01	69.61
well-organized	.83	.02	56.60
methodical	.85	.01	60.85
Interactional justice (Wang et al., 2014)**:** during the disruption and resolution (or lack thereof),			
this supplier treated your firm in a polite manner	.79	.02	34.88
this supplier treated your firm with respect	.76	.02	31.29
this supplier was sympathetic to your firm's situation	.65	.03	21.72
this supplier treated your firm with dignity	.63	.03	21.15
Distributive justice (Wang et al., 2014): during the disruption and resolution (or lack thereof),			
this supplier put in more efforts than your firm to resolve the disruption	.73	.02	34.86
this supplier invested more resources than your firm in the disruption resolution process	.84	.02	57.52
this supplier spent more time to handle the disruption	.81	.02	49.51
this supplier did well beyond your firm's efforts to resolve the disruption	.85	.01	62.23
this supplier contributed more than your firm to the disruption resolution process	.82	.02	51.02
Severity before resolution: assuming that no resolution was taken, this disruption would have negatively affected your firm's			
overall performance	.80	.02	43.07
overall internal operations	.72	.02	32.08
supply chain operations	.78	.02	40.88
the amount of dollar loss	.76	.02	37.41
overall customer satisfaction	.72	.02	31.13
overall competitiveness	.67	.03	26.22
Severity after resolution: in reality, this disruption has negatively affected your firm's			
overall performance	.83	.02	55.57
overall internal operations	.81	.02	49.72
supply chain operations	.83	.02	54.96
the amount of dollar loss	.84	.01	59.97
overall customer satisfaction	.79	.02	44.99
overall competitiveness	.79	.02	45.17

Table A-2.2 (Continued)

Multi-item Scale	Standard coefficient	Standard error	t-value[a]
Supply chain risk uncertainty (Hult et al., 2010; Chen and Paulraj, 2004):			
your firm's supply chain is constantly being threatened by external risks	.92	.02	62.15
your firm's supply chain constantly faces supply base, operations, and/or logistical obstacles	.90	.02	59.78
your firm's supply chain constantly needs to be planned for significant external problems that may arise in the supply chains	.55	.03	18.05
Buyers' satisfaction about the resolution process (Wang et al., 2014): describe your overall feelings with respect to the disruption resolution processes with this supplier:			
pleased	.84	.01	62.50
Satisfied	.87	.01	76.21
contented	.89	.01	90.37
gratified	.90	.01	94.45
fulfilled	.85	.01	65.15
Supply dependence (Wang et al., 2010):			
If our relationship was discontinued with the supplier, the supplier would have difficulty make up the sales volume in this product line	.85	.01	62.93
It would be difficult for the supplier to replace us	.86	.01	64.83
The supplier is quite dependent on us	.86	.01	68.67
The supplier does not have a good alternative business partner to us.	.89	.01	82.50
Buyer performance:			
customer satisfaction with our products	.72	.03	28.96
market performance of our products relative to competitors	.74	.02	30.85
level of initial market penetration	.77	.02	34.59
projected financial returns on our products	.77	.02	34.06

***Job satisfaction*:** are you satisfied with the kind of work you do in this job (1 not at all satisfied; 7 very satisfied)
Years of purchasing experience: log of the number years of experience you have in purchasing
Buyer industry: dummy variables capturing buyers' industries
Buyer/Supplier country: dummy variables capturing buyers' / suppliers' country
Buyer size: log of buyers' sales in RMB amount (in millions)
Buyer age: log of the number of the buyer's established years
Relationship age: log of the number of years since the buyer established a relationship with the supplier.
Frequency of personal contacts: In a typical month, approximately how many phone and face-to-face contacts about business issues do you personally have with this supplier's personnel (e.g., district manager)?
Supplier compensation: the disruption was financially compensated for by the supplier (1 completely disagree; 7 completely agree)

a. All factor loadings have p-values < 0.001

Table A-2.3: Descriptive Statistics, Correlations and Reliability

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Years of purchasing experience[a]																		
2. Buyer industry	-.12**																	
3. Buyer country	.11**	-.08*																
4. Buyer performance	.23**	-.06	.16**															
5. Buyer size[a]	.11*	.03	.11**	.13**														
6. Buyer age[a]	.26**	.01	.03	.12**	.35**													
7. Supplier country	.02	.01	.02	-.09*	.02	.02												
8. Supplier dependence	.29**	-.20**	.11**	.37**	.22**	.18**	-.01											
9. Relationship age[a]	.38**	-.05	.11**	.18**	.18**	.31**	-.03	.23**										
10. Frequency of personal contacts[a]	.08*	-.00	-.00	.05	.06	.04	.01	.15**	.09*									
11. Supplier compensation	.22**	-.20**	.05	.27**	.09*	.04	.03	.39**	.14**	.04								
11. Severity after resolution	.17**	-.07	-.00	.15**	-.01	.12**	.04	.18**	.06	-.01	.09*							
13. Severity before resolution	.18**	-.06	.01	.18**	.06	.09*	.08	.35**	.15**	.13**	.12**	.39**						
14. Supply chain risk uncertainty	.31**	-.15**	.04	.23**	.12**	.14**	-.00	.46**	.18**	.08*	.23**	.17**	.28**					
15. Procedural justice	.24**	-.14**	.11**	.32**	.09*	.11**	.08*	.41**	.21**	.04	.32**	.21**	.20**	.31**				
16. Interactional justice	.24**	-.02	.07	.26**	.10*	.09*	.16**	.30**	.16**	.07	.25**	.19**	.29**	.30**	.61**			
17. Distributive justice	.21**	-.12**	.07	.31**	.13**	.13**	.13**	.43**	.17**	.03	.29**	.15**	.27**	.27**	.59**	.64**		
18. Buyers' satisfaction	.28**	-.18**	.14**	.30**	.08	.12**	.14**	.47**	.25**	.01	.27**	.18**	.25**	.39**	.65**	.54**	.59**	
Mean	1.85	29.31	.32	5.02	3.32	2.41	.67	4.46	1.34	2.07	4.65	5.18	4.93	4.54	4.66	5.09	4.84	4.50
Standard deviation	.64	9.17	1.41	.80	1.31	.54	.68	1.20	.70	.85	1.41	.84	1.01	1.23	1.14	.91	1.05	1.24
Min.	0.00	1.00	.00	3.00	.59	0.69	.00	1.00	-1.39	.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Max.	3.40	72.00	11.00	7.00	7.60	4.13	7.00	6.75	3.40	5.19	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Composite reliability	-	-	-	.84	-	-	-	.92	-	-	-	.92	.88	.84	.92	.80	.91	.94
Average variance explained	-	-	-	.56	-	-	-	.75	-	-	-	.67	.55	.65	.71	.51	.67	.76

***p < 0.001, **p < 0.01, *p < 0.05. Two tailed p-values are reported.
a. Log transformed.

Table A-2.4: Discriminant Validity Test

Description	χ^2 constrained (df)	χ^2 unconstrained (df)	$\Delta\chi^2$ (Δdf)	p-value[a]
Procedural justice with interactional justice	2671.36 (784)	2391.76 (783)	279.60 (1)	0.00
Procedural justice with distributive justice	3356.33 (784)	2391.76 (783)	964.57 (1)	0.00
Interactional justice with distributive justice	2620.27 (784)	2391.76 (783)	228.51 (1)	0.00

a. $p < 0.05$ indicates that the unconstrained model has a significantly better fit than the constrained model.

Table A-2.5: Main Analysis Results (HLM)

	Model 1			Model 2			Model 3		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Intercept	4.50	.05	91.54***	4.51	.05	90.67***	4.50	.05	91.54***
Positive Signals									
Procedure Justice (PJ)	**.39**	**.06**	**6.58*****	.39	.06	6.58***	.32	.06	5.18***
Interactional Justice (IJ)	**-.06**	**.08**	**-.85**	-.06	.08	-.85	-.02	.08	-.25
Distributive Justice (DJ)	**.23**	**.06**	**3.64*****	.23	.06	3.64***	.30	.07	4.63***
Negative Signal									
Severity before resolution	-.08	.08	-1.01	-.08	.08	-1.01	-.09	.08	-1.09
Signaling Environment									
Supply chain uncertainty	.29	.04	6.75***	.29	.04	6.67***	.29	.04	6.75***
Moderations									
Severity X Procedure Justice				**-.18**	**.17**	**-.99**			
Severity X Interactional Justice				**-.22**	**.23**	**-.96**			
Severity X Distributive Justice				**.19**	**.21**	**.88**			
Uncertainty X Procedure Justice							**-.15**	**.04**	**-3.66*****
Uncertainty X Interactional Justice							**.11**	**.06**	**1.94***
Uncertainty X Distributive Justice							**.09**	**.05**	**1.90†**
Control Variables									
Manager's Characteristic									
Years of purchasing experience	.24	.09	2.82**	.22	.09	2.44*	.24	.09	2.82**
Buyer's Characteristics									
Buyer industry	-.01	.01	-2.53**	-.01	.01	-2.45**	-.01	.01	-2.53*
Buyer country	.07	.04	1.94*	.07	.04	1.84†	.07	.03	1.94*
Buyer performance	.29	.07	4.45***	.31	.07	4.63***	.29	.07	4.45***
Buyer size	-.00	.04	-.10	.01	.04	.17	-.00	.04	-.10
Buyer age	.06	.10	.59	.06	.10	.57	.06	.10	.59
Suppliers' Characteristics									
Supplier country	.21	.06	3.41***	.21	.06	3.41***	.21	.06	3.51***
Relationship Characteristics									
Supplier dependence	.07	.06	1.25	.07	.06	1.25	.06	.06	1.02
Relationship age	.67	.17	4.06***	.67	.17	4.06***	.67	.17	4.12***
Frequency of personal contacts	-.20	.17	-1.17	-.20	.17	-1.17	-.22	.17	-1.30
Disruption Event									
Supplier compensation	-.11	.04	-2.84**	-.11	.04	-2.84**	-.11	.04	-2.93**
Severity after resolution	.03	.06	.42	.03	.06	.42	.04	.06	.64
-2 log-likelihood		1709.60			1711.00			1706.90	

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two tailed p-values are reported.

Table A-2.6: Supplementary Analysis #1: Curvilinear Effects (HLM)

	Model 4			Model 5			Model 6		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Intercept	4.63	.06	82.05***	4.62	.06	82.86***	4.62	.06	84.51***
Positive Signals									
Procedure Justice (PJ)	**.39**	**.06**	**6.58***	.42	.06	7.06***	.32	.06	5.18***
PJ squared	**-.16**	**.07**	**-2.11***	-.26	.06	-4.04***	-.34	.07	-5.08***
Interactional Justice (IJ)	**-.06**	**.08**	**-.85**	-.08	.07	-1.10	-.02	.08	-.25
IJ squared	**-.11**	**.09**	**-1.17**						
Distributive Justice (DJ)	**.23**	**.06**	**3.64***	.26	.06	4.20***	.30	.07	4.63***
DJ squared	**-.09**	**.08**	**-1.04**						
Negative Signal									
Severity before resolution	-.08	.08	-1.01	.09	.09	.91	-.09	.08	-1.09
Signaling Environment									
Supply chain uncertainty	.25	.04	5.71***	.25	.04	5.71***	.34	.04	6.86***
Moderations									
Severity X PJ				**-.04**	**.18**	**-.24**			
Severity X PJ squared				**-.20**	**.06**	**-3.45*****			
Severity X IJ				**-.38**	**.22**	**-1.69†**			
Severity X DJ				**.38**	**.21**	**1.78†**			
Uncertainty X PJ							**-.15**	**.04**	**-3.66*****
Uncertainty X PJ squared							**-.14**	**.05**	**-3.17*****
Uncertainty X IJ							**.11**	**.06**	**1.94****
Uncertainty X DJ							**.09**	**.05**	**1.90†**
Control Variables									
Manager's Characteristic									
Years of purchasing experience	.20	.08	2.38*	.20	.08	2.38*	.20	.08	2.36*
Buyer's Characteristics									
Buyer industry	-.01	.01	-2.74*	-.01	.01	-2.74**	-.01	.01	-2.06*
Buyer country	.07	.03	2.01*	.07	.03	2.01*	.06	.03	1.80†
Buyer performance	.30	.06	4.64***	.30	.06	4.64***	.30	.06	4.69***
Buyer size	-.00	.04	-.02	-.00	.04	-.02	.00	.04	.08
Buyer age	.09	.10	.87	.09	.10	.87	.07	.10	.72

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two-tailed p-values are reported.

Table A-2.6 (Cont'd)

	Model 4			Model 5			Model 6		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Suppliers' Characteristics									
Supplier country	.21	.06	3.41***	.21	.06	3.41***	.21	.06	3.51***
Relationship Characteristics									
Supplier dependence	.07	.06	1.25	.07	.06	1.25	.06	.06	1.02
Relationship age	.67	.17	4.06***	.67	.17	4.06***	.67	.17	4.12***
Frequency of personal contacts	-.20	.17	-1.17	-.20	.17	-1.17	-.22	.17	-1.30
Disruption Event									
Supplier compensation	-.11	.04	-2.84**	-.10	.04	-2.58**	-.11	.04	-2.93**
Severity after resolution	.03	.06	.42	.02	.06	.31	.04	.06	.64
-2 log-likelihood		1699.50			1690.90†			1689.30*	

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two-tailed p-values are reported.

Table A-2.7: Supplementary Analysis #2: High Severity versus Low Severity[a] (HLM)

	High Severity			Low Severity		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Intercept	4.59	.11	43.28***	4.53	.08	56.81***
Positive Signals						
Procedure Justice	**.43**	**.13**	**3.32*****	**.32**	**.09**	**3.35*****
Interactional Justice	**-.28**	**.16**	**-1.72†**	**.12**	**.11**	**1.02**
Distributive Justice	**.27**	**.14**	**2.02***	**.28**	**.10**	**2.77****
-2 log-likelihood		769.70			1013.60	
Number of observations		253			351	

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two-tailed p-values are reported.
a. Estimates of severity, supply chain uncertainty and control variables are omitted.

Table A-2.8: Supplementary Analysis #2: High Uncertainty versus Low Uncertainty[a] (HLM)

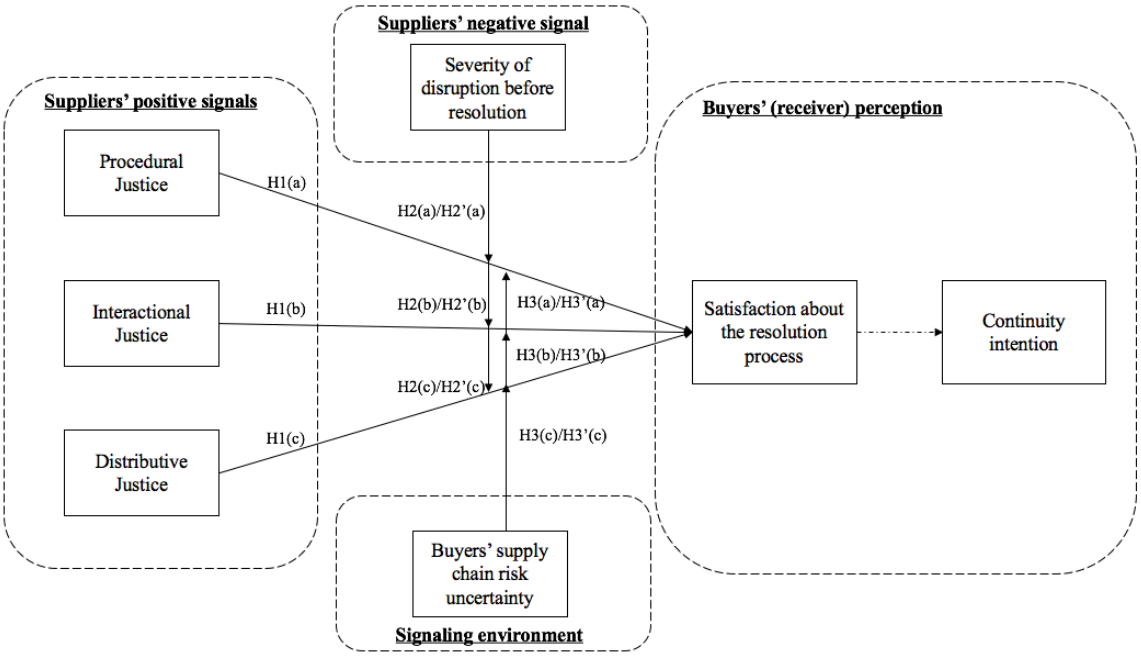
	High Uncertainty			Low Uncertainty		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Intercept	4.70	.12	37.69***	4.06	.14	29.57***
Positive Signals						
Procedure Justice	**.24**	**.08**	**3.07****	**.48**	**.09**	**5.13*****
Interactional Justice	**.15**	**.10**	**1.52**	**-.23**	**.12**	**-1.87†**
Distributive Justice	**.41**	**.08**	**4.91*****	**.15**	**.10**	**1.62**
-2 log-likelihood		878.10			824.60	
Number of observations		332			272	

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two-tailed p-values are reported.
a. Estimates of severity, supply chain uncertainty and control variables are omitted.

Table A-2.9: Supplemental Analysis #3: Effects of Justice Actions by Disruption Type[a] (HLM).

	Model T1			Model T2			Model T3		
Predictors	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value	Coefficient	Standard Error	t-Value
Intercept	4.07	.27	15.31***	4.49	.07	67.95***	4.48	.18	25.50***
Positive Signals									
Procedure Justice	**-.70**	**.34**	**-2.04***	**.65**	**.08**	**7.74*****	**-.02**	**.32**	**-.07**
Interactional Justice	**.06**	**.18**	**.32**	**-.21**	**.10**	**-2.06***	**.03**	**.44**	**.08**
Distributive Justice	**1.14**	**.18**	**6.17*****	**.15**	**.08**	**1.85†**	**.10**	**.33**	**.30**
Negative Signal									
Severity before resolution	1.62	.31	5.15***	-.27	.11	-2.34*	-.09	.08	-1.09
Signaling Environment									
Supply chain uncertainty	.08	.23	.35	.25	.06	4.71***	.12	.14	.87
-2 log-likelihood		638.10			897.80			208.80	
Number of observations		225			311			68	

***p < 0.001, **p < 0.01, *p < 0.05, †p <0.10. Two-tailed p-values are reported.
a. Estimates of control variables are omitted.



Note: We do not theorize satisfaction's effect on continuity, hence the dash-dotted line. Given the empirical evidence (e.g., Wang et al., 2014; Hofer, Knemeyer & Dresner, 2009), we expect that satisfaction should positively affect the buyers' decision to continue the focal relationship

Figure A-2.1: Conceptual Framework

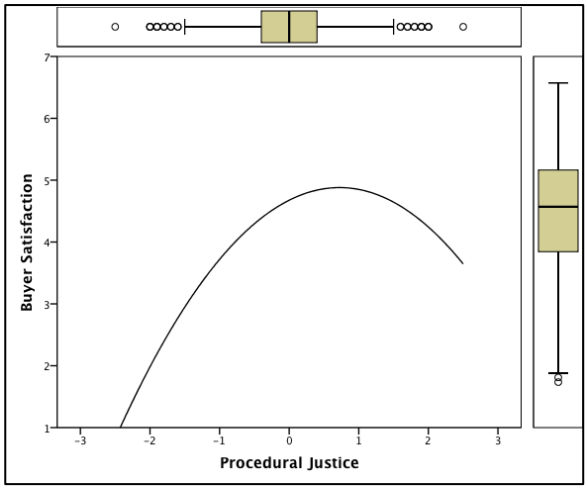


Figure A-2.2: The Curvilinear Effect of Procedural Justice on Buyers' Satisfaction

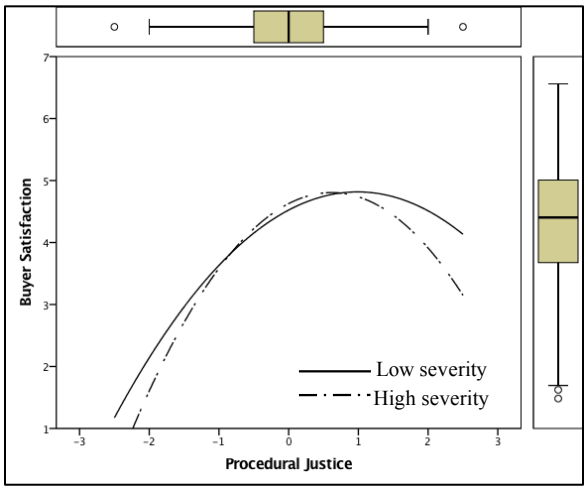


Figure A-2.3: The Moderating Effect of Severity on the Curvilinear Effect of Procedural Justice

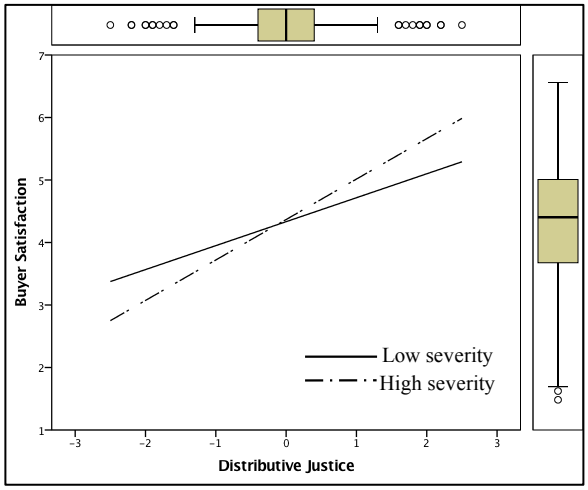


Figure A-2.4: The Moderating Effect of Severity on the Linear Effect of Distributive Justice

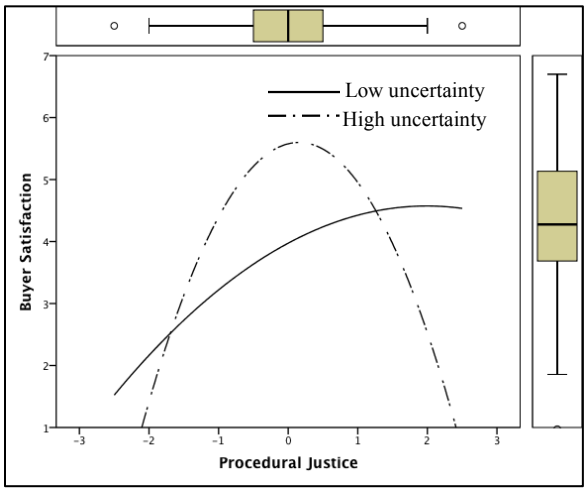


Figure A-2.5: The Moderating Effect of Uncertainty on the Curvilinear Effect of Procedural Justice

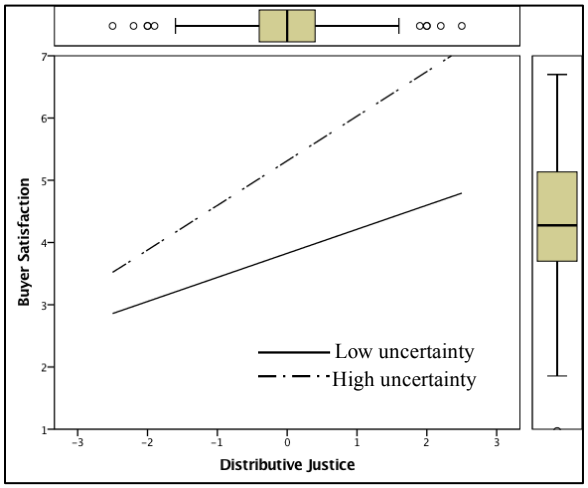


Figure A-2.6: The Moderating Effect of Uncertainty on the Linear Effect of Distributive Justice

CHAPTER III
UNEXPLOITED POWER IN MULTIMARKET BUYER-SUPPLIER NEGOTIATIONS: AN EXPERIMENTAL STUDY

ABSTRACT

Power plays a central role in buyer-supplier exchanges. Yet, most studies have focused on (or assumed) a single exchange between a buyer and a supplier while overlooking *multimarket buyer-supplier exchanges*—in which a buyer and a supplier handle multiple exchanges across different product markets. We recognize that individual exchanges across markets may interfere with one another; thus, insights obtained from the single-market exchange may not be extrapolated to the multimarket counterpart. Furthermore, while many power studies assume that firms in a powerful position can and will wield power against their exchange partners for favorable outcomes—a focus on power use, we recognize conditions under which these firms are held back from using power—hence our focus on power *non-use*. Our study aims to identify exogenous conditions inherent to the multimarket context (e.g., organization, market, resource) and test how these conditions jointly shape power non-use. With theoretical insights grounded in resource dependence theory, multimarket literature, and organization design literature, we test our conceptual framework in the setting of buyer-supplier negotiation. We conduct an economics-based bargaining experiment based on a variation of the alternate-offer game. We identify two scenarios leading to power non-use. Our result has an additional implication for the procurement literature, suggesting that centralized procurement (traditionally viewed as a lever in favor of power use) could *restrict* power use depending on the buyer's versus the supplier's bargaining positions within and across markets.

INTRODUCTION

Power is defined as the ability of a firm to influence its exchange partner's decisions and conduct (Emerson, 1962) as a result of the latter's dependence on the former (Pfeffer & Salancik, 1978). As such, power plays a central role in buyer-supplier exchanges. Studies have identified sources of power (Hunt & Nevin, 1974; Lusch & Brown, 1982) and have shown that power dynamics within a buyer-supplier exchange could affect the parties' trust of and satisfaction with each other, their integrated operations (Zhao, Huo, Flynn, & Yeung, 2008 Yeung, 2008), and ultimately relationship performance (Benton & Maloni, 2005; Frazier & Rody, 1991; Maloni & Benton, 2000; Young-Ybarra & Wiersema, 1999). Recognizing that how power drives relationship performance remains a "black box," behavioral operations scholars have shifted their focus to power-related behaviors and to how firms leverage power advantages to obtain desirable outcomes via those behaviors (e.g., Nair, Narasimhan, & Bendoly, 2011 ; Narasimhan, Nair, Griffith, Arlbjørn, & Bendoly, 2009). In doing so, scholars have started identifying the underlying process—how a firm's possession of power affects the firm's performance in a buyer-supplier exchange.

Despite these valuable insights into buyer-supplier power-related behaviors, two major areas have been largely overlooked. First, while most power studies have focused on or assumed a *single* exchange between the focal buyer and the focal supplier, these firms in many cases have on-going exchanges across *multiple* product markets[5] (Greve, Baum, Mitsuhashi, & Rowley, 2010; Shipilov, 2009; Trautmann, Turkulainen, Hartmann, & Bals, 2009). We term these phenomena as

[5] Some papers define *multimarke*t as across multiple geographic-product markets (e.g., Reimann et al., 2017). Our paper, however, focuses only on product markets to distant our study from global supply chain management and internationalization.

multimarket buyer-supplier exchanges (c.f. Reimann, Shen, & Kaufmann, 2017b). With the implicit assumption of *ceteris paribus* in other exchanges, current research focusing on (or assuming) single exchanges may run the risk of seeing only half the picture. Yet firms' conduct and outcomes within one exchange may interfere with those in others. For instance, a firm may use fewer of its influence tactics than it typically would during its exchange with its partner in one market, hoping that its partner will return the favor during their exchange in another market. Such interdependence has received little scholarly attention. One notable exception is Reimann et al. (2017), who first drew attention to power dynamics in multimarket buyer-supplier exchanges and showed that the increasing degree of multimarket contact has a differential impact on how buyers versus suppliers use their power. Like most power studies' findings (Crook et al., 2017), Reimann et al.'s (2017) pertained to power use. However, it remains unclear under what conditions firms in multimarket exchanges would restrict their exploitation of power—i.e., power *non-use*. This lack of clarify leads us to the second neglected area.

It has been widely conjectured that firms in a powerful position—i.e., less dependent on their exchange partners (Pfeffer & Salancik, 1978)—can and will fully exploit their power to control and influence their partner's decisions (Frazier & Rody, 1991), thus benefitting their organizations, plausibly at the expense of their less-powerful partners' welfare—e.g., fewer profit shares (Benton & Maloni, 2005). However, in some scenarios, a firm's power advantage over its partner does *not* lead to power use (Hillman, Withers, & Collins, 2009). In those cases, a powerful firm's exploitative behavior may *be held back* by exogenous conditions[6]. More research is called for to investigate such conditions leading to power *non-use* (c.f. Crook et al., 2017).

Addressing these two voids, this study aims to investigate factors driving power non-use behaviors in multimarket buyer-supplier exchanges. Specifically, we focus on three exogenous factors inherent to the multimarket context. The first factor is *exchange diffusion* that speaks to focal firms' organizational structure. It refers to the phenomenon that the power of firms can be diffused when they lack the bundling and structuring apparatus to leverage power (Crook et al., 2017). One such apparatus in a multimarket exchange is the decision-making structure of the buyer's procurement and the supplier's selling. As firms conduct multiple exchanges, their decisions about those exchanges can be centralized or decentralized across markets. We study how the centralization versus decentralization of firms' decision-making affects the use of power across markets.

The second factor is *spheres of influence*, which relate to focal firms' relative influence within and across markets. It refers to the extent to which multimarket exchange partners have dominant positions in specific markets (Edwards, 1955; Jayachandran, Gimeno, & Varadarajan, 1999). Literature studying multimarket competition (i.e., multimarket dynamics in relationships between competitors) has identified spheres of influence as one boundary condition impacting how aggressively firms behave (Jayachandran et al., 1999). We argue that in multimarket vertical exchanges, the buyer's and the supplier's spheres of influence across markets can similarly impact how aggressively power advantages are exploited.

[6] By *exogenous conditions*, we mean conditions that are given and thus less controllable by the decision-makers.

The third factor is *mutual dependence*, referring to the relative importance of the resources two firms bring to the exchange as well as the availability of other providers of the same or similar resources in specific markets (Crook et al., 2017). Some observational studies have suggested that mutual dependence—a different concept from dependence asymmetry—leads to collaborative behaviors (e.g., Casciaro & Piskorski, 2005; Gulati & Sytch, 2007). We thus study how mutual dependence drives power non-use.

To explicitly assess power-related behaviors and the corresponding outcomes, we situate our study in the context of buyer-supplier negotiations. To investigate the three factors' roles in driving power non-use within multimarket buyer-supplier negotiations, we develop hypotheses grounded in resource dependence theory, multimarket competition literature, and organization design literature. We then test hypotheses via an economics-based experiment anchored in a bargaining game (i.e., a variation of the stylized alternate-offer game) (Binmore, Morgan, Snaked, & Sutton, 1991; Rubinstein, 1982). We find that a powerful firm's power non-use is collectively shaped by levels of exchange diffusion, spheres of influence, and mutual dependence; in some cases, one factor's shaping effect depends on the others'.

Notable implications emerge. First, while studies of buyer-supplier power dynamics have mainly focused on (or assumed) exchanges within a single market (c.f. Reimann et al., 2017b), we highlight the underexplored *multimarket* buyer-supplier exchanges. In doing so, we can identify critical factors pertaining to this overlooked multimarket context and demonstrate these factors' relevance in shaping buyer-supplier power dynamics. Second, while literature has often assumed that powerful firms could and would fully leverage power to influence their partners and benefit their own organizations (Hillman et al., 2009), we challenge this assumption by proposing conditions in a multimarket context leading to power *non-use* (Crook et al., 2017). Empirically, we illustrate that the three factors collectively result in power non-use and that one factor's impact may depend on other factors. Third, whereas procurement literature has often proposed centralization as an important lever to increase buying firms' bargaining position when sourcing from suppliers (Monczka, Handfield, Giunipero, & Patterson, 2015), we demonstrate the opposite in our research context—as a buyer negotiates contracts with its supplier across multiple markets, centralization may *restrict* the buyer from fully leveraging its bargaining power if the buyer does not possess dominant (or more powerful) positions across all of the markets against the supplier. In fact, when the buyer dominates only a subset of the markets, a *decentralized* structure benefits the buyer in terms of leverage. Finally, although bargaining literature has acknowledged that individual negotiators often deviate from the optimal (or equilibrium) bargaining outcome (c.f. Camerer, 2011; Kagel & Roth, 1995), studies examining such behavioral deviation have mostly emphasized personal or interpersonal characteristics, such as fairness concerns (Katok & Pavlov, 2013), trust (Beer, Ahn, & Leider, 2017), demographic attributes (Stuhlmacher & Walters, 1999), and experience (Lumineau & Henderson, 2012; Nadler, Thompson, & Boven, 2003). Instead, we focus on the structural side of contract negotiation by looking beyond single-contract bargaining. In doing so, we discover a bargaining situation in which the negotiators face a gain *and* a loss domain simultaneously (i.e., two different contracts) and exhibit deviation from the equilibrium (in addition to the deviation accounted for by personal characteristics).

THEORETICAL BACKGROUND AND HYPOTHESES

Power Use in the Form of Negotiation

Use of power can be manifested in a variety of scenarios (e.g., conflict resolution, price setting, etc.), among which contract negotiation is plausibly one of the most common. In negotiations, buyers and suppliers leverage power to acquire favorable contractual terms (Cox, 2001) and, more importantly, a larger profit share (Cook & Emerson, 1978). Therefore, profit share can be viewed as a surrogate for the degree of exploited power in an exchange, multimarket or not. The larger the share gained via a contract negotiation, the more the power is exploited. Hence, negotiation (sometimes called *bargaining* in economics and channel literature) serves as an ideal context to directly examine power non-use.

Behavioral operations studies have explored negotiation via laboratory experiments (e.g., Carter & Stevens, 2007; Eckerd et al., 2013; Ho, Su, & Wu, 2014; Jap, 2007). Yet, most studies have *either* deployed a principal-agent model to uncover a contract design (e.g., Eckerd et al., 2013; Ho et al., 2014) *or* structured buyer-supplier negotiations as auctions (e.g., Carter & Stevens, 2007; Jap, 2007) or take-it-leave-it offers (e.g., Katok & Pavlov, 2013). Such designs have thus ignored the back-and-forth negotiation that is more prevalent in buyer-supplier interactions (Nagarajan & Bassok, 2008). In contrast, we model the buyer-supplier negotiation as a *sequential* bargaining game by extending a stylized alternate-offer model (Binmore et al., 1991; Rubinstein, 1982), in which (a) offers, counteroffers, opening offers and negotiation breakdowns can be explicitly observed; and (b) causal relationships between exogenous conditions (i.e., exchange diffusion, spheres of influence, and mutual dependence) and subsequent power behaviors can be analyzed. We further illustrate the details of our game-theory model in a later section.

Dependence Asymmetry and Value Appropriation

One core tenet of resource dependence theory is the relation between power and dependence—a firm's power is derived through its resource positions and dependencies via other firms (Pfeffer & Salancik, 1978). As proposed by Emerson (1962), dependence of one firm on another can be defined as negatively proportional to the availability of alternatives outside the focal exchange (see also Narasimhan et al., 2009). When a buyer/supplier has more alternative suppliers/buyers to purchase/sell its products, the buyer/supplier has low dependence on its partner and thus possesses bargaining power. Narasimhan et al. (2009), for instance, framed dependence asymmetry as a locked-in situation: when a buyer does not have alternative suppliers while its supplier has alternative buyers, the buyer is locked into the exchange and has less power. Notably, it is the *relative* power rather than the absolute power that gives a firm a stronger position in relation to its partner; thus, power is reflected as two firms' *dependence asymmetry*. Adopting this view, we define the more profitable alternatives of a firm in comparison to its partner's as indicating this firm's power advantage over its partner.

Literature has conjected that powerful firms, via exerting control over less powerful partners, can request favorable contractual terms and ultimately appropriate more value (e.g., Cox, Watson, Lonsdale, & Sanderson, 2004; Nyaga, Lynch, Marshall, & Ambrose, 2013). Hence, value appropriation has been often viewed as a consequence of power and dependence asymmetry (Crook & Combs, 2007). In the multimarket negotiation setting, suppose one firm has more

alternative partners providing similar resources at a reasonable rate while the other firm has few alternatives across markets. The former firm can switch easily to alternatives at relatively low costs and thus not lose much if the negotiations break down, whereas the latter firm may find switching to a substitute costly if the negotiations fail. Therefore, given its power advantage across markets, the firm with profitable alternatives is more likely to exploit its power to capture more profits in the focal negotiation (Cook & Emerson, 1978). In the focal context, we view appropriating value as capturing profits from a multimarket negotiation. We focus on power-advantaged firms' value appropriation.

Power in Multimarket Buyer-Supplier Exchanges

Most power studies either have assumed a single exchange within the focal relationship or have at least failed to validate that the exchanges occurred in a single product market. In other words, prior findings related to power have been based on the assumption (in many cases invalid) that the focal exchange is independent from other exchanges and hence the only locus where power is used. However, as firms often conduct exchanges across multiple product markets where these exchanges can be interdependent (Reimann et al., 2017b), holding such an assumption can lead to overlooked but critical factors shaping the firms' use of power across markets.

First, depending on the degree of centralization in the focal firms' decision-making structure, decisions for a specific exchange may or may not interfere with decisions for the others. In other words, whether the decisions across multimarket exchanges are conducted by a centralized decision-maker (e.g., a centralized procurement function) or by decentralized decision-makers (e.g., procurement functions of individual business units), a firm's power advantage in specific markets may or may not have a spillover effect. Thus, the centralization of a decision-making structure needs to be incorporated. Second, a firm that is powerful in one market may not be as powerful in another market. Thus, the power position of a firm in one market may not reflect its overall position in relation to the exchange partner; nor does the overall power of a firm necessarily render it in a strong position in specific markets. Thus, a granular investigation of firms' positions is needed vis-à-vis the exchange partner in individual markets as well as across markets. Third, while two firms could be highly dependent on each other and thus perceive each other important in one market, they are not necessarily jointly dependent on each other across multiple markets. Thus, while scholars have noted the impact of mutual dependence in a single-market context, mutual dependence must be gauged across markets for multimarket exchanges.

We present a conceptual framework proposing three factors that are inherent to the multimarket context and that drive power non-use in Figure A-3.1. (All the figures and tables are included in Appendix 3.).

Exchange Diffusion and Power Non-Use

Exchange diffusion refers to the extent to which a firm's power is diffused if it lacks sufficient apparatus to structure and bundle the power appropriately (Crook et al., 2017). A power-advantaged firm's power tends to be underexploited (as a result of dependence asymmetry) when exchange diffusion increases.

While exchange diffusion may take various forms (Crook et al., 2017), we argue that in a multimarket buyer-supplier relationship, the increasing level of decentralization in the firms' decision-making indicates a higher level of exchange diffusion. When a buyer/supplier decentralizes procurement/sales at the business-unit level, individual units of the firm negotiate contracts with its partner's respective units (i.e., decisions are made independently across business units without coordination). In contrast, when a buyer/supplier centralizes procurement/sales at the corporate level, the two firms centralize contract negotiations across business units (i.e., decisions are centralized and coordinated at the firm level).

Studies examining group buying or selling phenomena have recognized the concept of exchange diffusion in the form of the decision-making structure. For instance, buyers with less power may establish a coalition to enhance their position against a powerful supplier (e.g., Anand & Aron, 2003; Jing & Xie, 2011). Similarly, less powerful suppliers can forge a coalition to negotiate a single contract with a more powerful buyer and divide the contract within their selling group (Wu & Choi, 2005). Relatedly, individual business units within a corporation can be centralized to aggregate power (Mintzberg, 1973), even for a short period of time (Siggelkow & Levinthal, 2003). Although these studies do not speak directly to dyadic buyer-supplier exchanges, they provide insights into the decision-making structure's role in influencing power dynamics.

Because the focal firm (buyer or supplier) gauges its negotiation moves based on its dependence on its partner, the significance of exchange diffusion in light of the firm's behaviors relates to the dominance of the firm-level vis-à-vis the business-unit-level dependence asymmetry. Under low exchange diffusion, the negotiation decisions are centralized at the firm level; thus, focal firms tend to rely more on the firm-level dependence asymmetry to guide their power use. If the firm is less dependent on its partner, it will exploit its firm-level power advantage in negotiating across multiple business units regardless of the unit-level dependence asymmetry. Under high exchange diffusion, individual units make independent decisions; thus, the unit-level dependence asymmetry dominates. Because decentralized decision-makers have limited insight into the power dynamics at the firm level in relation to the exchange partner, their negotiation behaviors are more likely to be guided by the unit-level power (dis)advantage regardless of how the power aggregates at the firm level. Overall, for a firm with a power advantage at the firm level, low exchange diffusion highlights its firm-level advantage and hides its unit-level disadvantage (if any). On the other hand, for a firm with a power disadvantage at the firm level, low exchange diffusion accentuates its weakness at the firm level, whereas masking its unit-level advantage (if any). As a result, a firm with a power advantage can capture higher profits with low exchange diffusion. In comparison, high exchange diffusion dilutes the power position's impact (advantage or disadvantage) at the firm level. Hence,

Hypothesis 1. A high/low level of exchange diffusion reduces/increases the value the power-advantaged firm appropriates from a multimarket negotiation.

Spheres of Influence and Power Non-Use

Spheres of influence—the extent to which exchange partners have dominant market positions in specific markets—have been recognized as critical market-related factors that confines firms' aggressive behaviors (e.g., Jayachandran et al., 1999; McGrath, Chen, & MacMillan, 1998).

Specifically, it has been argued that spheres of influence can limit interfirm rivalry. Suppose Firms A and B compete in Markets I and II. If Firm A dominates Market I (compared to Firm B) while Firm B dominates Market II (compared to Firm A), both firms tend to treat their dominant market as the primary interest. Thus, Firm A limits its competitive actions in Market II in exchange for Firm B's reduced rivalry in Market I. In other words, such an arrangement of spheres of influence gives each firm "retaliatory power" (Jayachandran et al., 1999: 57)—if either firm is attacked in its own dominant market, it can deploy attacks in the other's dominant market.

The same logic can be applied to multimarket buyer-supplier relationships. Suppose the buyer and the supplier have on-going exchanges spanning Markets I and II and the buyer has more power overall than the supplier in the form of less dependence on the supplier. If the buyer has an advantaged position in Market I while the supplier has an advantaged position in Market II (although across the two markets, the buyer is more powerful), then both the buyer and the supplier may be less aggressive in exploiting their advantaged positions in each other's dominant market so that they can avoid retaliatory behaviors in the other market. In other words, less power is exploited, and the buyer appropriates less value. We refer to this arrangement as *narrow spheres of influence* because the power-advantaged firm only dominates a subset of markets. In contrast, if the buyer has advantaged positions in both Markets I and II, then the buyer does not withhold exploiting power because the supplier does not have a strong foothold and, thus, cannot deploy retaliation in either market. We refer to this arrangement as *broad spheres of influence* because the powerful firm dominates all markets. The above argument is the same if the supplier is the more powerful firm. Overall, for a power-advantaged firm with narrow spheres of influence, its use of power is limited because it likes to avoid retaliation from its disadvantaged partner; a power-advantaged firm with broad spheres of influence can use more power because its disadvantaged partner does not possess retaliatory power. Thus,

Hypothesis 2. Narrow/broad spheres of influence reduce/increase the value the power-advantaged firm appropriates from a multimarket negotiation.

Furthermore, high exchange diffusion's impact on restricting power use is strengthened as spheres of influence go from broad to narrow. When a firm has advantages over its partner across *all* markets (i.e., broad spheres of influence), the impact of high exchange diffusion may not be substantial because the business units of the advantaged firm can still exploit its power in specific markets, even though its unit-level power is less than its firm-level power. At the same time, the disadvantaged partner with weaker positions across all markets is little affected by the level of exchange diffusion because this partner has little power to exploit at either the unit level or the firm level. Therefore, the share that the advantaged firm gains does not change much. In contrast, high exchange diffusion's impact is more salient if the advantaged firm has a strong position in some markets but a weak position in the rest. In this case, the advantaged firm's weaker units negotiate less aggressively because the firm gauges its power position based on the unit-level rather than the firm-level dependence asymmetry. If this firm has a centralized structure, the negotiation for those weaker units can be conducted more aggressively because the firm-level power is leveraged. Thus,

Hypothesis 3. The negative relationship between high exchange diffusion and the power-advantaged firm's value appropriation is stronger/weaker when spheres of influence are narrow/broad.

Mutual Dependence and Power Non-Use

As Emerson's (1962) seminal work has suggested (albeit lost in Pfeffer & Salancik, 1978), the concept of dependence between two firms should be viewed in two ways. First is *dependence asymmetry*, the power imbalance between two firms referred to as their *power differential*. Second is *mutual dependence* between two firms—the *sum* of their dependencies regardless of their power differential. Mutual dependence (also called *joint dependence*) captures a buyer-supplier dyad's bilateral dependencies (Casciaro & Piskorski, 2005). Research has shown that within a single-market buyer-supplier exchange, power imbalance and mutual dependence are two distinct constructs that empirically produce different results (e.g., Gulati & Sytch, 2007).

As previous observational studies have suggested, two firms with a high degree of mutual dependence tend to promote collaborative behaviors and expect the focal exchange's continuity (e.g., Casciaro & Piskorski, 2005; Gulati & Sytch, 2007). Although this insight into interfirm relationships is based on exchanges within a market, it applies to those relationships with multimarket exchanges, except that mutual dependence must be assessed across markets. When mutual dependence is high, the power-advantaged firm can be particularly concerned that the power-disadvantaged firm may abandon the focal negotiations if it is pressed too hard. Therefore, the power-advantaged firm is more likely to avoid exploitative behaviors in contrast to when mutual dependence is low. In addition, it has been shown that mutual dependence triggers equity concerns (Gulati & Sytch, 2007), i.e., a fair distribution of the collective value created within the relationship. Because of the fairness concern, the power-advantaged firm tends to demonstrate higher reciprocity and respect during the interaction and exploit less power, thus appropriating less value (Cook & Emerson, 1978). Hence,

Hypothesis 4: High/low mutual dependence reduces/increases the value the power-advantaged firm appropriates from a multimarket negotiation.

In addition, mutual dependence moderates the effect of exchange diffusion in that high mutual dependence further exacerbates the restrictive impact of high exchange diffusion on power use. Because the power-advantaged firm has a decentralized structure, its power is diffused across individual business units; thus, each unit negotiates with the partner less aggressively. If at the same time this firm has high mutual dependence with the partner, the individual units' use of power is further tempered by equity concerns and the desire to demonstrate reciprocity. Therefore, exchange diffusion and mutual dependence create double hurdles to prevent the power-advantaged firm from fully wielding its power and capturing value. Hence,

Hypothesis 5. The negative relationship between high exchange diffusion and the power-advantaged firm's value appropriation is stronger/weaker when mutual dependence is high/low.

An Optional Breakdown Bargaining Model with Random Proposers

In this section, we present the analytical bargaining model to depict the focal firms' negotiation moves and further manifest concepts—e.g., power advantages, exchange diffusion, spheres of influence, and mutual dependence.

Nash's (Nash, 1950) seminal work laid the foundation for bargaining games; it presented a cooperative game structure for bargaining and proposed the classic Nash bargaining solution. If basic axioms are satisfied, there is a unique Nash equilibrium that specifies the profit allocation between two bargainers. Later behavioral economics studies have noted that individuals' behaviors often deviate from the Nash solution (cf. Kagel & Roth, 1995). Distinct features of this bargaining model (and other cooperative bargaining variations) are such that (a) the model by design does not specify the details in the negotiation process (e.g., back-and-forth or one-shot, first mover, etc.) and (b) emphasizes players' payoffs as a collective (in some cases called a *coalition*) as opposed to individual payoffs. While these features may be desirable for studying other topics (e.g., value creation, see Leider & Lovejoy, 2016; collaboration, see Nagarajan & Bassok, 2008), they are less desirable in our case due to both our interest in negotiation moves determining value appropriation and our focus on power—a context often filled with competitiveness.

Instead, we use a variation of Rubinstein's (1982) non-cooperative bargaining game as our analytical model. Rubinstein proposed a sequential bargaining model with complete information, designating the structure for a negotiation process consisting of offers and counteroffers. The setup of the basic Rubinstein's game is as follows. Two players (a proposer and a receiver) negotiate to split a pie (π), the size of which is shrinking by rounds of negotiation at a time discount δ[7]. In the first round of a game, the proposer makes a split offer to the receiver, and then the receiver decides whether to accept or reject the offer. If the offer is accepted, the two players reach an agreement while each gets a share according to the proposer's offer. If the offer is rejected, the game goes to the next round, and the receiver makes a counteroffer to the proposer to split the shrunken pie. The proposer may either accept or reject this counteroffer. The game continues with an infinite time horizon until an agreement is reached. This model is attractive because it (a) resembles the back-and-forth negotiation process in business practice and (b) has a pure strategy subgame perfect equilibrium (SPE).

Subsequent experimental studies have tested the basic Rubinstein model and its various extensions (e.g., various manipulations of time discounts and bargaining power, imperfect information, etc.) (see Camerer, 2011; Kagel & Roth, 1995 for detailed reviews). Generally, participants anchor their decisions on two different focal points in the game, and the common split is within the range of these two focal points (Binmore, Shaked, & Sutton, 1988; Camerer, 2011; Zwick & Mak, 2012): (a) the equilibrium as indicated by the model—suggesting that participants recognize and exploit their relative bargaining position to a certain degree (Binmore, Swierzbinski, & Tomlinson, 2007; Camerer, 2011) and (b) the 50-50 fair split—reflecting participants' concerns with social norms and fairness (Binmore, Swierzbinski, Hsu, & Proulx, 1993; Bolton, 1991; Zwick & Mak, 2012). Relatedly, participants do not fully exploit the bargaining power to the model's

[7] The time discount can be common or different to the two players—both have been tested empirically. In this paper, the time discount is assumed to be common. In a buyer-supplier context, this discounting factor indicates the incurred transaction cost and opportunity cost from more rounds of negotiation.

prediction, often using only 60-70% (Anbarci & Feltovich, 2013; Fischer, Güth, & Pull, 2007). This under-exploitation may be due to participants' (a) fairness concerns—taking the partners' utility for fairness into one's own strategic considerations (Camerer, 2011; Kagel & Roth, 1995) or (b) lack of capability in conducting backward inductions (Binmore et al., 2007). Note that both are endogenous factors influencing power use.

Among these studies, Binmore et al.'s (1991) study proposed an extension of Rubinstein's model—an optional breakdown model with outside options (w) that models relative bargaining power (i.e., dependence asymmetry). Its notable feature is that the two players are assigned different outside options that they can take if the negotiation breaks down. A player with a larger outside option value than its partner is less dependent on its partner and thus has a power advantage. This feature resembles Emerson's (1962) definition of *dependence asymmetry*. Behavioral operations studies have adopted a similar approach in order to model relative power (e.g., Narasimhan et al., 2009). In this model, the negotiation procedure is largely the same as in Rubinstein's model, except that the receiver rejecting the offer can either continue with a counteroffer in the next round or leave the table (hence the name *optional breakdown*). In the latter case, the negotiation concludes, and the two players take their respective outside options. Binmore et al. (1991) found that negotiations generally end with either a breakdown or a split offering the receiver her outside option in that particular round.

We extend Binmore et al.'s model (1991) by (a) randomizing who is the proposer (i.e., who makes the offer) for each round within a negotiation (see also Binmore et al., 2007) and across negotiations and (b) having the players negotiate two contracts in some treatment conditions while a single contract in others. The first extension serves two purposes. First, it reduces the proposer's first-mover advantage—another source of power advantage that may confound with dependence asymmetry (Ertogral & Wu, 2001). Second, it makes the game relatively stationary and thus easier for backward induction (Binmore et al., 2007). The second extension operationalizes exchange diffusion as hypothesized in our framework (Figure A1.1).

Our settings. Suppose Firm B has Business Units B_1 and B_2. Similarly, suppose Firm S has Business Units S_1 and S_2. Units B_1 and B_2 each have an exchange with Units S_1 and S_2 across two markets, respectively. Thus, B_i must negotiate how to split the surplus of contract i with S_i ($i = 1,2$). Suppose Contract i has an initial value of π_i, and $\pi_1 = \pi_2 = 10K$. Also suppose π_i depreciates in value by a time discount factor of δ (i.e., opportunity cost of taking time to reach a deal) so that the surplus of Contract i in Round t ($t = 1,2 \dots$) is $\pi_i \delta^{t-1}$. Each business unit of Firm B and S has its own outside option w_{Bi}, w_{Si} (i.e., the alternative profits each unit could obtain outside the focal exchange). Similar to π_i, w_{Bi}, w_{Si} depreciates by a time discount factor of δ so that the outside option in Round t ($t = 1,2 \dots$) has a value of $w_{Bi}\delta^{t-1}, w_{Si}\delta^{t-1}$.

B_i has a *power advantage* over S_i if $w_{Bi} > w_{Si}$ and vice versa; B_i and S_i have equal power if $w_{Bi} = w_{Si}$ (e.g., Binmore et al., 1991). Likewise, Firm B has a power advantage over Firm S if $\sum_{i=1,2} w_{Bi} > \sum_{i=1,2} w_{Si}$ and vice versa. To ensure that the two sides are incentivized to be involved in the focal exchange in the first place, we let $\pi_i \geq w_{Bi} + w_{Si}$, $\forall = 1,2$. Because the contract surplus and the outside options depreciate at the same rate, this incentive holds throughout the game. Notably, the power-advantaged firm has a broader *sphere of influence* if both of its business

units have a larger outside option than its partner's respective units; in contrast, the power-advantaged firm has a narrower sphere of influence if one of its units has a larger outside option than its counterpart, whereas the other has a smaller outside option. Furthermore, the differential between the contract surplus and the sum of the two sides' outside options is conceptually equivalent to *mutual dependence* in RDT (Emerson, 1962), i.e. $\pi_i - (w_{Bi} + w_{Si}), \forall = 1,2$, as the differential reflects the sum of value both sides obtain by staying in the focal exchange. The larger the differential, the higher the focal exchange's mutual dependence is on both sides.

In the setting of a high level of *exchange diffusion* (i.e., decentralized decisions by individual business units), a negotiation between B_i and S_i over Contract i goes through the following sequence of events:

1. In Round t (say $t = 1$), Nature determines who is the proposer via a uniform random distribution so that B_i and S_i have an equal chance of being drawn.
2. The proposer (say B_i) makes an offer $(x_{Bit},\ x_{Sit})$ to split $\pi_i \delta^{t-1}$ in Round t while the receiver is waiting (note $\pi_i \delta^{t-1} \geq x_{Bit} + x_{Sit}$).
3. The receiver (S_i) sees the offer and decides to
    a. accept the offer, i.e., the game ends and B_i, S_i get the payoff $(x_{Bit},\ x_{Sit})$);
    b. reject and take the outside option, i.e., the game ends and B_i, S_i get the payoff $(w_{Bi}\delta^{t-1}, w_{Si}\delta^{t-1})$; or
    c. reject and continue negotiating, i.e., the game goes to Round $t + 1$, on which the payoffs depend.
4. If going to Round $t + 1$, the value of the contract and the outside options is reduced to $\pi_i \delta^t, w_{Bi}\delta^t, w_{Si}\delta^t$. Repeat steps through 1-3.

The setting of a low level of exchange diffusion has the same game sequence as that of a high level—with one exception. Instead of having Units B_i and S_i negotiate over a single contract (Contract 1 or 2), Firms B and S negotiate over Contracts 1 and 2 simultaneously. Notably, we specify the contract negotiations' *independence*, i.e., decisions over one contract will not interfere with those over the other. A negotiation between B and S over Contracts 1 and 2 unfolds as follows:

1. In Round t (say $t = 1$), Nature determines who is the proposer via a uniform random distribution so that B and S have an equal chance of being drawn.
2. The proposer (say B) makes two offers $(x_{Bit},\ x_{Sit})$ $(i = 1,2)$ to split $\pi_i \delta^{t-1}$ $(i = 1,2)$ in Round t while the receiver is waiting (note $\pi_i \delta^{t-1} \geq x_{Bit} + x_{Sit}$).
3. The receiver (S) sees the offers and decides to
    a. accept both offers, i.e., the game ends and B, S get the payoff $(x_{B1t} + x_{B2t},\ x_{S1t} + x_{S2t})$;
    b. accept one offer (say Offer 1) and reject the other (say Offer 2) and take its outside option, i.e., the game ends and B, S get the payoff $(x_{B1t} + w_{B2}\delta^{t-1}, x_{S1t} + w_{S2}\delta^{t-1})$;
    c. reject both offers and take respective outside options, i.e., the game ends and B, S get the payoff $(w_{B1}\delta^{t-1} + w_{B2}\delta^{t-1}, w_{S1}\delta^{t-1} + w_{S2}\delta^{t-1})$;
    d. accept one offer (say Offer 1) while rejecting the other (say Offer 2) and continue negotiating the other, i.e., the game goes to Round $t + 1$ (with Contract 2 only) and

B, S get the payoff from Contract 1 (x_{B1t}, x_{S1t}) (the payoff from Contract 2 depends on Round $t+1$);

e. reject both offers while taking one contract's outside option (say Contract 1) and continue negotiating over the other (say Contract 2), i.e., the game goes to Round $t+1$ (with Contract 2 only) and B, S get the payoff from Contract 1 ($w_{B1}\delta^{t-1}, w_{S1}\delta^{t-1}$) (the payoff from Contract 2 depends on Round $t+1$); or

f. reject both offers and continue negotiating over both contracts, i.e., the game goes to Round $t+1$ (with both contracts) (the payoffs from both contracts depend on Round $t+1$).

4. If going to Round $t+1$ (only for the contract(s) that is/are chosen to be continued), the value of Contract i and outside options is reduced to $\pi_i\delta^t, w_{Bi}\delta^t, w_{Si}\delta^t$. Repeat steps through 1-3.

Mathematically, levels of exchange diffusion should *not* alter the firms' behaviors as a result of the contracts' independence. Empirically, however, the decision-makers may change their behaviors as their locus of perceived power shifts from the unit-level to the firm-level outside options, as hypothesized. All the above information is common knowledge. For this sequential game with complete information, an optimal (i.e., Pareto-efficient Nash equilibrium) strategy for the negotiation is that (a) the negotiation ends in the first round (cf. Binmore et al., 1989) and (b) Firms B and S get the split as specified by SPE (details in Appendix 4).

EXPERIMENTAL DESIGN AND PROCEDURES

Setup

The negotiation experiment's structure was presented in the previous section. Randomly paired players (representing two firms) negotiated to split the contracts' profit. The initial value of the contracts' profit and the outside options—depreciating by each additional round—was common knowledge to both players. Notably, we were *not* interested in how various levels of dependence asymmetry impact value appropriation. Instead, our goal was to study—given a certain level of dependence asymmetry between the two firms—how the three exogenous factors lead to under-used power and thus under-appropriated value. Therefore, in the experiment, Firm B was designated to *always* have a larger number of outside options across the two contracts as compared to Firm S, i.e., $(w_{B1}+w_{B2})-(w_{S1}+w_{S2})=7\text{K}$ *ECU* (experimental credit units). This level of dependence asymmetry was fixed across all conditions.

Treatment and Session Design

Three treatments, each with two levels, were administered between subjects: exchange diffusion (ED), spheres of influence (SI), and mutual dependence (MD). The ED treatment was operationalized by manipulating two firms' negotiation structures. When ED was low, pairs of players represented centralized decision-makers for each firm and negotiated over two contracts simultaneously; hence, each buyer-supplier dyad had one pair of players. When ED was high, pairs of players represented decentralized decision-makers for each firm and negotiated over a single contract; hence, each dyad had two pairs of players. The SI treatment was operationalized as the number of contracts for which Firm B had a larger outside option than Firm S. When SI was narrow, Firm B had the power advantage over Contract 1 but a disadvantage over Contract 2. When SI was

broad, Firm B had advantages over both contracts. The MD treatment was operationalized as the differential between the contracts' initial profits and the initial value of the two firms' outside options. When MD was low, $\sum_{i=1,2}\pi_i - (w_{Bi} + w_{Si}) = 7K\ ECU$; when MD was high, $\sum_{i=1,2}\pi_i - (w_{Bi} + w_{Si}) = 11K\ ECU$.

Table A1.1 shows the permutations of outside options for the two firms across Contracts 1 and 2 ($w_{B1}, w_{S1}, w_{B2}, w_{S2}$) under levels of MD and SI. Table A-3.2 presents the equilibrium split (i.e., normative benchmark) of contracts for each treatment condition. Using our pilot, we calibrated the outside options' permutations with two goals: (a) to ensure sufficient effect sizes—distinguishable negotiation outcomes—across treatments, and (b) to keep the normative benchmark across conditions close to one another so that theoretically the appropriated value across conditions would converge.

We randomly assigned treatments to sessions. Table A-3.3 illustrates treatment details across sessions. Notably, we did *not* have a full factorial design as we were not interested in the interaction between SI and MD. Thirteen sessions[8] were conducted in a behavioral economics laboratory in cohorts of 12 to 16 players. Each session lasted 60~90 minutes during which participants played 4~6 repeated bargaining games (with one additional trial game) (see details in Table A-3.3). We had 420 contract observations (i.e., unit-level negotiations) and thus sufficient power to test treatment effects. Note that during sessions with a low level of ED, the second-half session (Games 3 and 4) had the same structure as the first-half (Games 1 and 2), except that the initial values of the contracts' profits and the firms' outside options were scaled down by half. This design addressed endowment effects (Kahneman, Knetsch, & Thaler, 1990) by equating the low-ED group's expected payoffs (earnings from two contracts) to the high-ED group's (earnings from one contract).

To ensure that our sample behaved similarly to those of previous studies and that our experiment procedure worked well, we ran a replication session (i.e., Session 8) with equal power (i.e., outside options) between the two firms.

Participants and Procedures

Participants. We had a total of 176 participants. We randomly assigned our 176 participants to treatment sessions; each participated in only one treatment session. All treatment sessions were conducted in a behavioral economics laboratory at a large public research institution. Our participants were undergraduate and graduate students from a range of majors (mostly business and engineering). We recruited the participants through SONA, an online recruiting system, with cash as the only incentive to participate.

Procedures. Upon arrival, participants were randomly seated at desks with a privacy screen and randomly paired anonymously. No verbal communication was allowed once the session started. The pairings were randomly reassigned at the beginning of each new game so that every participant was paired with a *different* partner across games (i.e., *stranger matching*). Out of a pair of

[8] We had 12 regular sessions to test treatment effects and an additional session (in which two firms were assigned equal outside options) for a validity check.

participants at the beginning of a new game, one was randomly assigned as the power-advantaged firm (larger outside option(s)) and the other as the disadvantaged firm (smaller outside option(s)); this assignment remained throughout the game. Furthermore, each participant's role as either a proposer or a receiver was randomly assigned at the beginning of each round within a game *and* across games to ensure that all participants theoretically had an equal chance of being a proposer or a receiver. Details regarding the random assignment of pairings, outside options, and roles were explained before the games. Participants were not told the number of games they would play, thus alleviating end-of-game effects. The experiment interface was programmed via zTree (Fischbacher, 2007).

At the beginning of each session, a questionnaire was administered to measure participants' (a) risk preference (Andreoni, Kuhn, & Sprenger, 2015) and (b) cognitive abilities (Frederick, 2005; Narayanan & Moritz, 2015). A written copy of the instructions was read aloud to the participants (see Appendix 5 for an example instruction). Next, a series of repeated bargaining games, including one trial, was administered. Participants were shown their and their partner's earnings at the end of each game. A second questionnaire was administered toward the end of the sessions to capture the participants' (a) demographic information (years in college, GPA, major, and gender); (b) experience (negotiation experience, experiment experience, working experience); (c) perceived outcome fairness throughout negotiation games; (d) perceived competitiveness of their negotiation behaviors; and (e) perceived fair splits of Contracts 1 and 2. At the end of each session, participants' cash earnings were calculated by multiplying their earnings from all games by a predetermined exchange rate (known to participants) and adding that amount to a $6 (USD) participation fee. All payouts were privately made in cash.

DATA ANALYSES AND RESULTS

Data Preparation

Our experimental design led to a slightly different data structure across groups of low and high levels of ED. When ED was administered at the low level, we directly observed negotiation data at both unit- and firm-level as each pair of players negotiated two contracts across units in any game. When ED was high, we directly observed only unit-level data as each pair negotiated a single contract in any game. Therefore, to create firm-level data for the high-ED group, we manually paired unit-level data from Games 1 through 3 (Contract 1) with unit-level data from Games 4 through 6 (Contract 2) via a *randomly* assigned group ID at the beginning of each game. For instance, if Players 1 and 2 were assigned to Group 5 in Game 1 while Players 3 and 8 were assigned to Group 5 in Game 4, we viewed these two pairs' data as unit-level data for the same pair of firms. Participants were unaware of this assignment in order to mimic the reality that business units make independent decisions without knowing other units' choices within a decentralized structure. In doing so, we obtained data at the business-unit and the firm levels for all treatment conditions.

Consistent with our theorizing, the outcome variable—value appropriation—was indicated by the firms' captured profits via negotiations. Specifically, this variable was calculated as a firm's total profit captured from the two contracts over the contracts' total initial value.

We also included two sets of controls that could influence negotiation dynamics. The first set pertained to the experiment structure. First, due to the nature of repeated games, *period* (a ordinally coded variable) was included to control for learning and fatigue effects (e.g., Beer et al., 2017). Second, we included a dummy variable, *proposer in the first round*, indicating if the focal player was the proposer (coded as 1) or the receiver (coded as 2). Players who made the first proposal might have perceived a first-mover advantage and thus behaved more aggressively. Furthermore, theoretically (based on the normative prediction in Table A-3.2), proposers in the first round had an additional advantage in their bargaining position. This advantage would be another source of power potentially confounding with our manipulation of power advantage; thus, it needed to be controlled for.

The second set related to subjects. First, technically addressing the bargaining game requires backward reduction; thus, we controlled for the subjects' cognitive capability (Narayanan & Moritz, 2015) and GPA. The former variable, measured via the Cognitive Reflection Test, controlled for the subjects' tendency to allow abstract, analytical, and structured problem-solving processes to monitor, override, or endorse an intuitive, immediately available answer (Frederick, 2005). The latter variable was an indicator of the subjects' intelligence. Second, bargaining literature has indicated that the subjects' competitiveness improves the negotiation outcome; therefore, we controlled for perceived competitiveness (Neale & Bazerman, 1985). Likewise, one's perception of fairness may affect aggressiveness in negotiation tactics (Leider & Lovejoy, 2016). We included perceived fairness to capture the degree of equity perceived during negotiations. Third, subjects may present an other-regarding preference (Bolton & Ockenfels, 2000)—i.e., they care about others' welfare in addition to their own. In this case, subjects may underexploit their power as a result of their preference for a more evenly distributed split. We asked participants to identify the perceived fair amount that their partners should receive from the contracts and used their responses as the control for *other-regarding preference*. Finally, more experienced subjects can be more skillful in negotiation. Thus, we included *negotiation experience* and *working experience* as additional controls.

Descriptive Statistics

We first assessed the difference between the captured profits of power-advantaged firms and those of power-disadvantaged firms via a dependent sample-paired t-test. The results show that power-advantaged firms on average captured more profits than power-disadvantaged firms ($t = 2.58$, $p < .001$), thus indicating that players recognized and used their power to benefit their organizations.

Model Specification and Main Results

Model specification. Because our hypotheses focus on power-advantaged firms' value appropriation, we used the observations of power-advantaged firms as our analytical sample ($N = 278$). With the repeated game data structure, we adopted a mixed-effect model specification. Our outcome variable was value appropriation (captured total profit in a percentage). To test Hypotheses 1, 2, and 4—the main effects of three treatment variables (ED, SI, MD), fixed effects

included three treatments: period, proposer in the first round, and a set of subject controls[9]. We then included a subject random effect to account for individual heterogeneity. To test Hypotheses 3 and 5, we also included the interaction of SI and ED and the interaction of MD and ED, respectively.

Results. Table A-3.4 presents the main and interaction results. Among the three main effects (Table A-3.4, Model 1), surprisingly high ED ($B = 2.25$, $p < .05$) on average *increases* power-advantaged firms' value appropriation; this result is counter to the prediction, thus not supporting H1. As predicted, High MD reduces value appropriation, supporting H4 ($B = -3.02$, $p < .01$). SI has a null effect on the outcome variable, thus not supporting H2 ($B = .01$).

Among the two interaction effects (Table A-3.4, Model 2), narrow SI positively moderates the relationship between ED and value appropriation ($B = 3.69$, $p < .05$), supporting H3. Yet, due to exchange diffusion's *positive* main effect, the interaction presents an interesting pattern. As Figure A-3.2 illustrates, the positive relationship between ED and the power- advantaged firms' value appropriation is amplified under narrow SI than under broad SI. The interaction between MD and ED is positive, albeit nonsignificant ($B = 3.27$). Thus, H5 is not supported.

Supplemental Analysis and Results

A detailed look at interactions. To get a granular understanding of the interaction between ED and SI, we split the sample into two groups (narrow and broad SI) and tested exchange diffusion's main effects. Table A-3.5 shows the results. For the group of broad SI, ED has a null effect on value appropriation (Model 3a: $B = 0.96$); in contrast, for the group of narrow SI, high ED *increases* value appropriation (Model 3b: $B = 7.21$, $p < .001$).

Value appropriation deviated from the normative benchmark. Normative predictions indicate the amount of power a firm *should* exploit under the assumption of rational, profit-maximizing decision-makers. Thus, by assessing how much observed value appropriation deviated from normative predictions, we evaluated the behavioral bias in exploiting one's power. Specifically, we calculated *deviated value appropriation* as the difference between observed total profits and the normative benchmark, divided by the normative benchmark (in percentage). We also evaluated the mean of *deviated value appropriation* for power-advantaged firms ($M = -.09$, $t = -11.59$, $p < .001$) and power-disadvantaged firms ($M = -.04$, $t = -2.54$, $p < .05$). The result suggests that firms, regardless of their power positions and the three treatments' potential impact, tend to underexploit their power compared to the normative benchmark. This pattern is consistent with previous behavioral economics studies (c.f. Binmore et al., 2007; Camerer, 2011).

Next, we ran analyses with *deviated value appropriation* as the outcome variable and treatment factors (i.e., main effects and interaction effects) as predictors, along with the same controls as main models. In doing so, we evaluated the behavioral bias in using power, as accounted for by the three treatments. Table A-3.6 summarizes the results. Among the three main effects (Model 4), narrow SI restricts power use and leads to even lower captured profits deviating from the normative benchmark ($B = -4.58$, $p < .01$); in contrast, ED and MD have null effects. As for the interaction

[9] Each firm observation had two negotiated contracts. Thus, we averaged the scores of subject-specific controls across the subjects who participated in each of the two negotiations

effects (Model 5), narrow SI positively moderates the relationship between ED and deviated value appropriation ($B = 9.54$, $p < .05$). Figure A-3.3 illustrates that with low ED and narrow SI, captured profit is significantly lower than the benchmark and much lower than the other three cells.

Robustness Checks

Subsample of negotiations with closure. Our sample contained negotiations with both closure (agreement reached) and breakdowns (agreement not reached) (see other papers distinguishing the two cases, Leider & Lovejoy, 2016). Although both cases could occur, closure would yield a more efficient outcome for the dyad than a breakdown because the maximum collective value to be captured would equal the two contracts' total value (20K ECU) in the former case but would equal the number of outside options (strictly less than 20K ECU) in the latter case.

We wanted to explore how the three treatment factors jointly affect value appropriation for negotiations only resulting in an efficient outcome. Therefore, we reran the same model specification as in our main analysis, using the subsample of negotiations with closure ($N = 205$). Table A-3.7 presents the results. The main effects reveal a pattern similar to our main analysis. High MD increases value appropriation (Model 6: $B = 2.16$, $p < .05$). Yet, high MD's negative effect is only partially significant (Model 6: $B = 2.27$, $p = .09$). SI still has a null effect. The interaction effects also exhibit a similar, albeit slightly stronger, pattern. Narrow SI strengthens ED's impact on value appropriation (Model 7: $B = .5.47$, $p < .01$). More interestingly, high MD also significantly strengthens ED's impact (Model 7: $B = 4.89$, $p < .05$).

Alternative model specification. As an alternative to the mixed-effect model, we used the specification of pooled ordinary linear squares (pooled OLS) to test our hypotheses. In the pooled OLS model, we included the deviated appropriation as the outcome variable as well as the three treatments and the same set of controls as predictors. We estimated the model with the clustered standard error structure (clustered by subjects). This model specification imposed fewer restrictive assumptions than the mixed-effect specification, albeit producing less efficient estimates (Wooldridge, 2010). Results were highly consistent with our main mixed-effect specification.

Omitted subject characteristics. If omitted, other subject characteristics may bias the results. One of those characteristics is risk preference. Because our negotiation structure involved decision uncertainty, a subject that is highly risk averse may resort to a suboptimal outcome (Davis & Hyndman, 2018). We controlled for risk preference and had consistent results. Another characteristic is gender. We added a dummy variable of gender to the model and had the same results. Third, participants with experience in a similar economics-based experiment might better understand the game structure and infer the equilibrium outcome. We included a dummy variable indicating relevant experiment experience and found similar results. Finally, undergraduate and graduate students might behave differently due to their training level. Thus, we included years in college as an additional control, and the results remained robust.

DISCUSSION

Implications

While buyers and suppliers often manage multiple exchanges with each other across markets, such a multimarket phenomenon has received little scholarly attention (c.f. Reimann et al., 2017b). Yet, individual exchanges across markets can be interdependent. Thus, previous research, while studying the focal single exchange, may incorrectly assume *ceteris paribus* in other exchanges. Addressing this void in the research, our study focused on power dynamics—a critical element in buyer-supplier exchanges—in a multimarket setting. Drawing attention to multimarket buyer-supplier exchanges, Reimann et al. (2017b) studied how varying degrees of multimarket contact in a buyer-supplier relationship affected power-related tactics across buyers and suppliers. While that study was insightful, factors specific to the multimarket context potentially influencing power dynamics remain unknown. Hence, our study, while holding the degree of multimarket contact constant, identifies such factors—exchange diffusion, spheres of influence, and mutual dependence—and demonstrates these factors' joint effect on power-related behaviors. In doing so, we provide insights into multimarket buyer-supplier exchanges that cannot be offered by studies on single exchanges.

Second, while studies using resource dependence theory (RDT) have often assumed that powerful firms could and would fully leverage power (derived from resource dependence) to influence their partners and benefit their own organizations (Hillman et al., 2009), empirical evidence has suggested otherwise (e.g., Gulati & Sytch, 2007). Thus, RDT has been criticized for its lack of boundary conditions (Casciaro & Piskorski, 2005; Hillman et al., 2009), and there has been a call for research on conditions leading to power *non-use* (Crook et al., 2017). So far studies have explored *endogenous* conditions controlled by the focal firms—when firms *withhold* using power—such as reciprocity (Liu, Luo, & Liu, 2009) and fairness concerns (Narasimhan et al., 2009). Yet, little attention has been given to the *exogenous* conditions (e.g., decision-making structure, alternatives in the markets) under which firms are *held back* from using power. Answering the call, our study proposes three such conditions and identifies two scenarios leading to power non-use.

In one scenario, the two focal firms are mutually dependent on each other. Consistent with observational study (Gulati & Sytch, 2007), buyers and suppliers with mutual dependence may engage in more cooperative behaviors. Aggressive behaviors are restricted because the partner would likely retaliate against such behaviors, knowing that both parties are locked into the focal relationship (Casciaro & Piskorski, 2005); hence, if aggressive behaviors are exhibited, both parties face a less profitable situation. In fact, as our post-hoc result suggests, the observed cooperative behaviors are driven by profit-maximizing rationality. Decision-makers facing high mutual dependence realize that their welfare will be hampered by aggressive behaviors and thus *strategically* opt for cooperation to avoid retaliation.

In the other scenario, the powerful firm does *not* dominate all the exchanges across the markets while managing those exchanges in a centralized manner. In this case, the powerful firm exhibits a strong downward bias in estimating its overall power, therefore under-capturing close to 45% of the profits that should be appropriated. Insights from the prospect theory may serve as a plausible explanation: individual decision-makers tend to place more weight on losses than on gains

(Holmes Jr, Bromiley, Devers, Holcomb, & McGuire, 2011; Kahneman & Tversky, 1979). As power-advantaged firms have a centralized decision-making structure, their decision-makers face both contract decisions: one contract indicating dominance (gain domain) and the other indicating lack of dominance (loss domain). These decision-makers may then attribute more weight to the loss-domain contract than to the gain-domain contract in appraising the aggregated power; hence, such appraisal bias restricts the use of power use. Managers facing multimarket exchanges may need to look beyond their own organization and markets while further understanding their partners' organizations (i.e., whether partner firms make decisions in a centralized or decentralized structure) and markets (i.e., partner firms' bargaining position in relation to their organization within a market and across markets).

Related to the aforementioned finding regarding centralization, we also contribute to the procurement literature and practice. Studies have often proposed centralization as an important lever to increase buying firms' bargaining position when sourcing from suppliers (Crook et al., 2017); similarly, companies moving towards centralized procurement often hope to increase leverage via transformation (Monczka et al., 2015). Yet, our study reveals an opposite finding: as buyers negotiate contracts with suppliers across multiple markets, centralization may *restrict* buyers from fully leveraging their bargaining power if they do not possess dominant positions against suppliers across all markets. In contrast, a *decentralized* structure is more beneficial in this case—buyers are better off separating the negotiations occurring in their dominant markets from those in the markets without dominance. Although the decision-making structure may not be easily changed, at least centralized buyers can be more strategic in choosing what cards to show during the negotiation as opposed to putting all their cards on the table.

Finally, bargaining studies have emphasized the often-observed behavioral deviation from the optimal (or equilibrium) bargaining outcome (Camerer, 2011; Kagel & Roth, 1995), and behavioral studies have examined conditions causing deviation. However, most of those studies have focused on (inter)personal factors such as equity concerns (Katok & Pavlov, 2013), trust (Beer et al., 2017), demographic attributes (Stuhlmacher & Walters, 1999), and experience (Lumineau & Henderson, 2012; Nadler et al., 2003 2003). Instead, our study investigated the structural side of contract negotiation that may create behavioral deviation by looking beyond single-contract bargaining. With a two-contract design, we discovered a bargaining situation in which the negotiators face gain *and* loss domains simultaneously and observed 10% more deviation from the equilibrium (in addition to the deviation accounted for by personal characteristics such as fairness and competitiveness). In contrast, when the negotiators only face gain domains across the two contracts (albeit different levels in gain), no additional behavioral deviation was observed.

Limitations and Future Research

The aforementioned insights need to be considered in juxtaposition with our study's limitations. First, our study relied on a student sample, with the goal of focusing on the economic, profit-maximizing behaviors while avoiding unnecessary contextually confounding variables (e.g., participants' prior negotiation experience, organization policy, and culture). Yet, we recognize such factors' important role in influencing the negotiation conduct in practice. Therefore, future research can use samples of managers to understand the pertinent role of such factors as experience,

organizational culture, etc. Likewise, to keep the design simple, we disregarded other contingency factors such as product characteristics (e.g., customization, risk, etc.) and relationship attributes (e.g., relationship history, trust, etc.). Research can also incorporate such factors and test their impact. Second, our study used the perspective of resource dependence theory to study key constructs. However, we realize that power and mutual dependence can be operationalized in alternative ways. For instance, power can be manifested in coercive versus noncoercive strategies (Benton & Maloni, 2005; Frazier & Rody, 1991). Mutual dependence can be indicated by the criticality of the exchanged product (Gulati & Sytch, 2007) or the relationship-specific investment (Nair et al., 2011). Future studies can investigate those alternative ways of operationalization and test whether our results hold. Third, our study held the degree of multimarket contact constant (exchanges in two markets). Yet in practice, companies often have more multimarket contacts. It would be interesting to study whether and how our key constructs' impact varies depending on the degree of multimarket contact. Finally, our design assumed symmetricity in exchange diffusion across buyers and suppliers; in practice, two sides may have different levels of exchange diffusion (centralized vis-à-vis decentralized). Future studies could examine how focal firms behave differently with different decision-making structures.

APPENDIX 3: TABLES AND FIGURES

Table A-3.1: Parameter Table for Outside Options[a]

	MD = Low	MD = High
SI=Broad	$w_{B1} = 7000,\ w_{S1} = 1500$	$w_{B1} = 7000,\ w_{S1} = 500$
	$w_{B2} = 3000, w_{S2} = 1500$	$w_{B2} = 1000, w_{S2} = 500$
SI=Narrow	$w_{B1} = 8500,\ w_{S1} = 0$	$w_{B1} = 7500,\ w_{S1} = 0$
	$w_{B2} = 1500, w_{S2} = 3000$	$w_{B2} = 500, w_{S2} = 1000$

a. MD refers to mutual dependence. SI refers to spheres of influence of the power-advantaged firm.

Table A-3.2: Session Details[a]

	First Half[b]	Second Half[b]	# of subjects	Equilibrium[d]		
				Contract 1	Contract 2	Total
Session 7, 12	ED = Low MD = High SI = Broad	ED = Low MD = High SI = Broad $(\frac{1}{2}\pi_i, \frac{1}{2}w_i)$[c]	24	(7545, 2455) (7000, 3000)	(5500, 4500) (4500, 5500)	(13045, 6955) (11500, 8500)
Session 1, 6	ED = Low MD = Low SI = Broad	ED = Low MD = Low SI = Broad $(\frac{1}{2}\pi_i, \frac{1}{2}w_i)$[c]	24	(7545, 2455) (7000, 3000)	(5500, 4500) (4500, 5500)	(13045, 6955) (11500, 8500)
Session 4, 10	ED = Low MD = High SI = Narrow	ED = Low MD = High SI = Narrow $(\frac{1}{2}\pi_i, \frac{1}{2}w_i)$[c]	22	(7955, 2045) (7500, 2500)	(5500, 4500) (4500, 5500)	(13455, 6545) (12000, 8000)
Session 5, 11	ED = High MD = High (contract 1) SI = Broad	ED = High MD = High (contract 2) SI = Broad	32	(7545, 2455) (7000, 3000)	(5500, 4500) (4500, 5500)	(13045, 6955) (11500, 8500)
Session 2, 3	ED = High MD = Low (contract 1) SI = Broad	ED = High MD = Low (contract 2) SI = Broad	28	(7545, 2455) (7000, 3000)	(5500, 4500) (4500, 5500)	(13045, 6955) (11500, 8500)
Session 9, 13	ED = High MD = High (contract 1) SI = Narrow	ED = High MD = High (contract 2) SI = Narrow	32	(7955, 2045) (7500, 2500)	(5500, 4500) (4500, 5500)	(13455, 6545) (12000, 8000)
Session 8	ED = High $w_{B1} = w_{S1} = 4700$ Equal outside options	ED = High $w_{B2} = w_{S2} = 1000$ Equal outside options	10	(5300, 4700) (4700, 5300)	(5500, 4500) (4500, 5500)	(10800, 9200) (9200, 10800)

a. ED: exchange diffusion. MD: mutual dependence. SI: spheres of influence of the power-advantaged firm.
b. For sessions with low level of ED, first (second) half of the session contains 2 games; for sessions with high level of ED, first (second) half contains 3 games.
c. During the second half of low-ED sessions, the initial value of both contracts and outside options are scaled down by half.
d. Under this column, we show equilibrium split for each contract in the form of (Firm B's share, Firm S's share). There are two set of splits for each row: the first split represents the equilibrium when Firm B is the proposer; the second split represents the equilibrium when Firm S is the proposer. Theoretically, two firms should reach agreement on the equilibrium split in the first Round (when the size of contract is the largest). For games during the second half of low-ED sessions, the equilibrium split is half in size of those shown in the table.

Table A-3.3: Summary of Treatment Manipulation[a]

	ED = Low	**ED = High**
SI = Broad	MD = High (session 7,12)	MD = High (session 5,11)
	MD = Low (session 1,6)	MD = Low (session 2,3)
SI = Narrow	MD = High (session 4,10)	MD = High (session 9,13)

a. ED: exchange diffusion. MD: mutual dependence. SI: spheres of influence of the power-advantaged firm.
Note: Session 8—a replication session for validity check—is not shown. We did not administer the treatment condition of MD=Low and SI=Narrow.

Table A-3.4: Effects of Treatments on Power-Advantaged Firms' Value Appropriation

	Hypotheses (Predicted Direction)	DV = Power Advantaged Firms' Value Appropriation (In Percentage)			
		Model 1		Model 2	
Predictors		Coefficient	Standard Error	Coefficient	Standard Error
Intercept		28.45***	8.59	27.33***	4.43
Treatments					
Exchange diffusion (low as baseline)	**H1 (-)**	**2.25***	**.87**	5.63***	1.41
Spheres of influence (broad as baseline)	**H2 (-)**	**.01**	**.99**	1.76	1.38
Mutual dependence (low as baseline)	**H4 (-)**	**-3.86*****	**1.02**	-1.41	1.24
Moderations					
Exchange diffusion X Spheres of influence	**H3 (+)**			**3.69***	**1.77**
Exchange diffusion X Mutual dependence	**H5 (+)**			**3.27**	**1.63**
Controls					
Period		.04	.49	.10	.45
Proposer in the first round (dummy)		-2.53**	.86	-2.47**	.84
Subject controls					
Cognitive ability (avg.)		.74	.42	.60	.36
Negotiation experience (avg.)		-2.89*	1.18	-2.96*	.96
Working experience (avg.)		.07	.05	0.10*	.04
GPA (avg.)		1.94	1.00	1.70	1.03
Perceived competitiveness (avg.)		.87*	.32	1.09 **	.31
Perceived distributive fairness (avg.)		1.22***	.32	1.16**	.32
Other-regarding preference (avg.)		-6.58	3.58	-4.69	2.88
Deviance (-2 log-likelihood)		1810.20		1791.20	
Number of observations		278		278	
Number of subjects		142		142	

Note: The sample included observations of power-advantaged firms. Dummies for majors were also included in models, but the coefficient estimates were not reported for simplicity. All controls were averaged scores across subjects participating in the two contract negotiations.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Two tailed p-values are reported.

Table A-3.5: Effect of Exchange Diffusion by Levels of Spheres of Influence (SI)

	DV = Power Advantaged Firms' Value Appropriation (In Percentage)			
	Model 3a **Broad SI**		Model 3b[a] **Narrow SI**	
Predictors	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	46.05***	5.69	-.31.57**	9.18
Treatments				
Exchange diffusion (low as baseline)	**0.96**	**0.97**	**7.21***	**1.74**
Mutual dependence (low as baseline)	-3.71***	0.97	-	-
Controls				
Period	-.22	.63	.05	.63
Proposer in the first round (dummy)	-2.47*	1.04	-2.51	1.51
Subject controls				
Cognitive ability (avg.)	.82*	.42	-0.25	.79
Negotiation experience (avg.)	-2.30	1.05	-1.81	1.48
Working experience (avg.)	.06	.08	.08	.05
GPA (avg.)	2.42	1.42	1.21	1.67
Perceived competitiveness (avg.)	.92*	.42	1.33*	.65
Perceived distributive fairness (avg.)	1.25*	.56	.61	.61
Other-regarding preference (avg.)	-10.18*	5.16	-8.40	4.94
Deviance (-2 log-likelihood)	1213.40		542.10	
Number of observations	186		92	
Number of subjects	93		49	

Note: The sample included observations of power-advantaged firms. Dummies for majors were also included in models, but the coefficient estimates were not reported for simplicity. All controls were averaged scores across subjects participating in the two contract negotiations.

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Two tailed p-values are reported.

a. Due to the fractional factorial design, we do not have variation in the MD treatment in Narrow-SI group. Hence, there are no coefficient estimates for mutual dependence in Model 3b.

Table A-3.6: Effects of Treatments on Power-Advantaged Firms' Deviated Value Appropriation

	DV = Power Advantaged Firms' Value Appropriation Deviated from Equilibrium (In Percentage)			
	Model 4		Model 5	
Predictors	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-70.06***	13.83	-71.21***	7.19
Treatments				
Exchange diffusion (low as baseline)	**2.38**	**1.53**	9.43***	2.17
Spheres of influence (broad as baseline)	**-4.58****	**1.76**	0.20	2.29
Mutual dependence (low as baseline)	**-0.48**	**1.81**	1.19	2.12
Moderations				
Exchange diffusion X Spheres of influence			**9.54***	**2.98**
Exchange diffusion X Mutual dependence			**1.76**	**2.92**
Controls				
Period	-0.05	.76	-.06	.72
Proposer in the first round (dummy)	6.73***	1.37	6.86***	1.36
Subject controls				
Cognitive ability (avg.)	1.32	.75	1.14	.62
Negotiation experience (avg.)	-4.40*	2.06	-4.11**	1.49
Working experience (avg.)	.10	.09	0.13*	.06
GPA (avg.)	3.42*	1.74	2.99	1.72
Perceived competitiveness (avg.)	1.21*	.55	1.55*	.53
Perceived distributive fairness (avg.)	2.05***	.57	2.01***	.56
Other-regarding preference (avg.)	-11.26	6.14	-10.84*	5.06
Deviance (-2 log-likelihood)	2053.50		2033.30	
Number of observations	278		278	
Number of subjects	142		142	

Note: The sample included observations of power-advantaged firms. Dummies for majors were also included in models, but the coefficient estimates were not reported for simplicity. All controls were averaged scores across subjects participating in the two contract negotiations.

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Two tailed p-values are reported.

Table A-3.7: Effects of Treatments on Power-Advantaged Firms' Value Appropriation: Subsample of Negotiations with Closure

	DV = Power Advantaged Firms' Value Appropriation (In Percentage) (subsample)			
	Model 6		Model 7	
Predictors	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	65.07***	5.30	61.84***	4.90
Treatments				
Exchange diffusion (low as baseline)	**2.16***	**1.00**	7.03***	1.55
Spheres of influence (broad as baseline)	**-0.22**	**1.05**	2.96	1.56
Mutual dependence (low as baseline)	**2.29**	**1.27**	1.31	1.97
Moderations				
Exchange diffusion X Spheres of influence			**5.47****	**2.05**
Exchange diffusion X Mutual dependence			**4.89***	**2.37**
Controls				
Period	.20	.52	.17	.50
Proposer in the first round (dummy)	-3.00**	0.93	-2.58**	0.87
Subject controls				
Cognitive ability (avg.)	.61	.46	.42	.43
Negotiation experience (avg.)	-2.90	1.40	-2.32	1.21
Working experience (avg.)	.03	.04	.05	.04
GPA (avg.)	1.33	1.35	1.17	1.26
Perceived competitiveness (avg.)	0.95*	.37	1.17**	.38
Perceived distributive fairness (avg.)	1.06***	.35	0.96**	.36
Other-regarding preference (avg.)	-12.90*	4.23	-13.12**	4.55
Deviance (-2 log-likelihood)	1316.80		1295.00	
Number of observations	205		205	
Number of subjects	127		127	

Note: The sample included observations of power-advantaged firms. Dummies for majors were also included in models, but the coefficient estimates were not reported for simplicity. All controls were averaged scores across subjects participating in the two contract negotiations.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Two tailed p-values are reported.

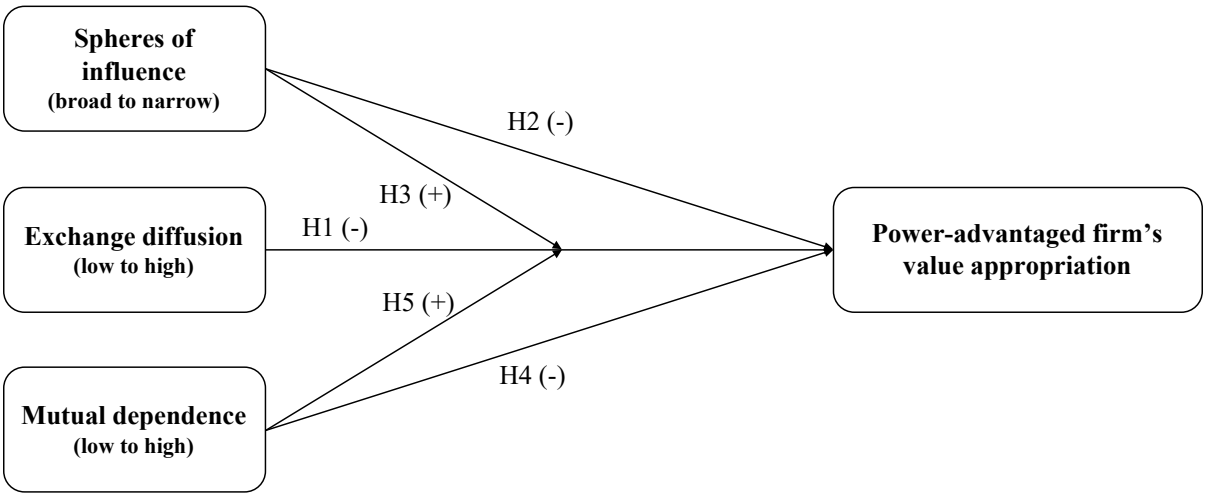


Figure A-3.1: Conceptual Framework

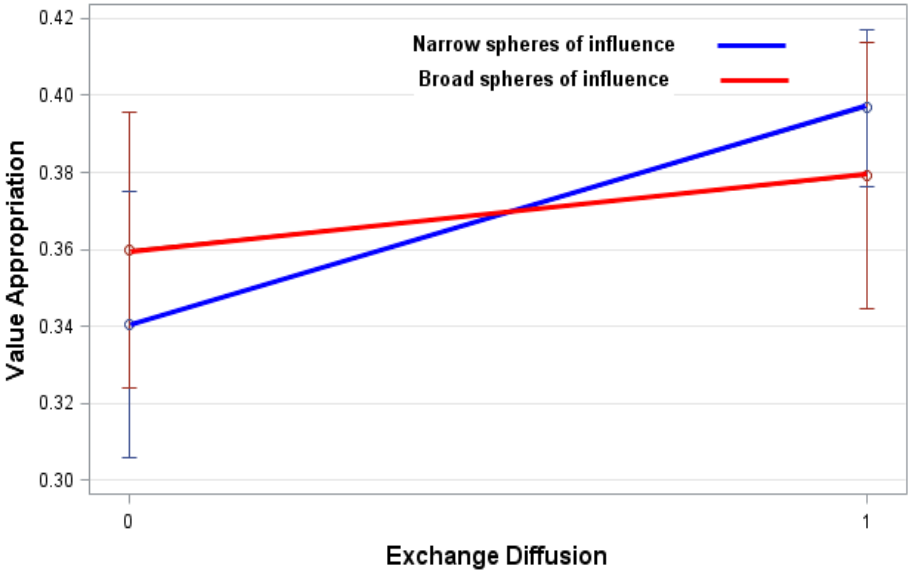


Figure A-3.2: The Moderating Effect Spheres of Influence on Value Appropriation (Main Analysis)

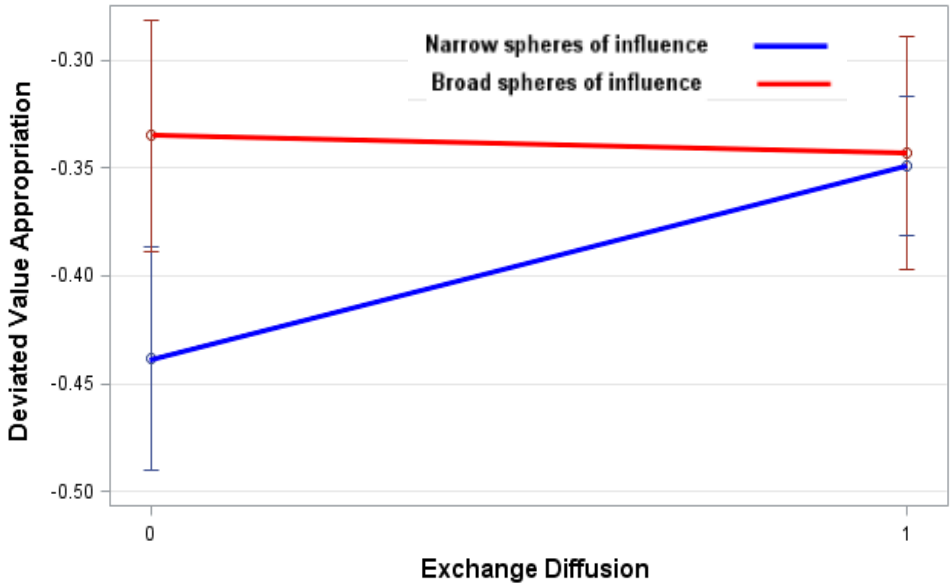


Figure A-3.3: The Moderating Effect Spheres of Influence on Deviated Value Appropriation (Supplemental Analysis)

APPENDIX 4: THE UNIQUE SUBGAME PERFECT EQUILIBRIUM (SPE)

In this appendix, we offer a formal demonstration of the subgame perfect equilibrium for our bargaining model—an optional breakdown model with random proposer. The setup of our model is illustrated the main manuscript. We reiterate the parameters as follows. Suppose two firms (B and S) negotiate to split a single contract valued at π (notice that the case in which firms negotiate two independent contracts at the same time has the same SPE). The contract depreciates by a time discount factor δ $(0 < \delta < 1)$ that is common to both firms, in that the negotiable value of the contract in Period t is:

$$\pi_t = \pi\delta^{t-1}$$

The game has infinite time horizon (cf. Binmore et al., 1989; Rubinstein, 1982). Two firms have respective outside options for the focal contract, valued at W_j , where $j = B, S$. Suppose $W_B \geq W_S$. Both sides' outside options depreciate by the same time discount factor δ, in that the value of outside options in Period t is:

$$W_{jt} = W_j\delta^{t-1}, \text{ where } j = B, S$$

The SPE refers to the Nash equilibrium of each iteration of a repeated game. For every repeated game with finite players and perfect information (such as this game), there exist pure strategy SPEs that can be derived with backward induction (Osborne, 2004). Following Shaked and Sutton (1984) and Sutton (1986), a unique subgame perfect equilibrium is characterized by a strategy profile in which the proposer offers a split corresponding to this perfect equilibrium at each subgame, and the receiver accepts that split at each subgame. This is important for the following demonstration of the SPE.

Note that the feature of random proposer–in each iteration of the repeated game (subgame) the two firms have equal chance of being a proposer—makes our game stationary. Thus, each subgame has exactly the same structure as its preceding and following period (if any). This means that the firms need to look no further than one period into the future for backward inductions that help form their decisions at SPE.

Let M_j (m_j) represent the maximum (minimum) of payoff that Firm j $(j = B, S)$ gets if Firm j $(j = B, S)$ is the prosper in a SPE. It follows that in Period 1:

$$\pi - M_B \geq max\{[0.5\delta m_S + 0.5\delta(\pi - M_B)], W_S\} \quad (1)$$
$$\pi - M_S \geq max\{[0.5\delta m_B + 0.5\delta(\pi - M_S)], W_B\} \quad (2)$$
$$m_B \geq \pi - max\{[0.5\delta M_S + 0.5\delta(\pi - m_B)], W_S\} \quad (3)$$
$$m_S \geq \pi - max\{[0.5\delta M_B + 0.5\delta(\pi - m_S)], W_B\} \quad (4)$$

Inequality (1) means that, Firm S must receive the amount no less than the right-hand-side; otherwise, Firm S will reject. The right-hand-side amount refers to the least Firm S can get if not accept the offer—as the maximum of Firm S's outside option (if quit the negotiation) and Firm S's expected payoff of Firm S if it continues bargaining into the next period. This inequality sets

an upper bound for how much Firm B can request in a SPE. The same logic applies to inequality (2)—the upper bound for how much Firm S can request in a SPE. Inequality (3) means that, Firm S will always accept an offer if it exceeds the right-hand-side amount. The right-hand-side mount refers to the most Firm S can get if not accept—as the maximum of Firm S's outside option (if quit the negotiation) and Firm S's expected payoff if it continues bargaining into the next period. This inequality sets a lower bound for how much Firm B can request in a SPE. By the same token, inequality (4) sets a lower bound for how much Firm S can request in a SPE. To solve this, we distinguish six cases.

I. $W_S \geq 0.5\delta M_S + 0.5\delta(\pi - m_B)$ and $W_B \geq 0.5\delta M_B + 0.5\delta(\pi - m_S)$ and
It is easily shown that

$$\pi - W_B \leq m_S \leq M_S \leq \pi - W_B,$$
$$\pi - W_S \leq m_B \leq M_B \leq \pi - W_S.$$

Also, we can solve that

$$W_B \geq \frac{\delta}{2}\pi,$$
$$W_S \geq \frac{\delta}{2}\pi.$$

Namely, when $W_B \geq \frac{\delta}{2}\pi, W_S \geq \frac{\delta}{2}\pi$:
if Firm B is the proposer of this Period, Firm B and Firm S get the split $(\pi - W_S, W_S)$ in SPE;
if Firm S is the proposer of this Period, Firm B and Firm S get the split $(W_B, \pi - W_B)$ in SPE.

II. $0.5\delta m_S + 0.5\delta(\pi - M_B) < W_S < 0.5\delta M_S + 0.5\delta(\pi - m_B)$ and $0.5\delta m_B + 0.5\delta(\pi - M_S) < W_B < 0.5\delta M_B + 0.5\delta(\pi - m_S)$
It can be shown that the inequalities show contradiction that $\delta > 1$.

III. $W_S \leq 0.5\delta m_S + 0.5\delta(\pi - M_B)$ and $W_B \leq 0.5\delta m_B + 0.5\delta(\pi - M_S)$
It easily shown that

$$\frac{2-\delta}{2}\pi \leq m_S \leq M_S \leq \frac{2-\delta}{2}\pi,$$
$$\frac{2-\delta}{2}\pi \leq m_B \leq M_B \leq \frac{2-\delta}{2}\pi.$$

Also, we can solve that

$$W_B \leq \frac{\delta}{2}\pi,$$
$$W_S \leq \frac{\delta}{2}\pi.$$

Namely, when $W_B \leq \frac{\delta}{2}\pi, W_S \leq \frac{\delta}{2}\pi$:
if Firm B is the proposer of this Period, Firm B and Firm S get the split $(\frac{2-\delta}{2}\pi, \frac{\delta}{2}\pi)$ in SPE;
if Firm S is the proposer of this Period, Firm B and Firm S get the split $(\frac{\delta}{2}\pi, \frac{2-\delta}{2}\pi)$ in SPE.

IV. $W_S \leq 0.5\delta m_S + 0.5\delta(\pi - M_B)$ and $W_B \geq 0.5\delta M_B + 0.5\delta(\pi - m_S)$.
It can be shown that

$$\pi - W_B \leq m_S \leq M_S \leq \pi - W_B,$$
$$\pi - \frac{\delta}{2-\delta}(\pi - W_B) \leq m_B \leq M_B \leq \pi - \frac{\delta}{2-\delta}(\pi - W_B).$$

Also, we can show that

$$W_B \geq \frac{\delta}{2}\pi,$$
$$W_S \leq \frac{\delta}{2-\delta}(\pi - W_B) \leq \frac{\delta}{2(2-\delta)}\pi.$$

Namely, when $W_B \geq \frac{\delta}{2}\pi, W_S \leq \frac{\delta}{2-\delta}(\pi - W_B)$:
if Firm B is the proposer of this Period, Firm B and Firm S get the split $(\pi - \frac{\delta}{2-\delta}(\pi - W_B), \frac{\delta}{2-\delta}(\pi - W_B))$ in SPE;
if Firm S is the proposer of this Period, Firm B and Firm S get the split $(W_B, \pi - W_B)$ in SPE.

V. $W_S \leq 0.5\delta m_S + 0.5\delta(\pi - M_B)$ and $0.5\delta m_B + 0.5\delta(\pi - M_S) < W_B < 0.5\delta M_B + 0.5\delta(\pi - m_S)$.
There is no solution as it leads to an empty set of W_B that satisfies the inequalities and the assumption.

VI. $0.5\delta m_S + 0.5\delta(\pi - M_B) < W_S < 0.5\delta M_S + 0.5\delta(\pi - m_B)$ and $W_B \geq 0.5\delta M_B + 0.5\delta(\pi - m_S)$.
There is no solution as it leads to an empty set of W_S that satisfies the inequalities and the assumption.

The SPE for Period 1 applies to the rest of periods (i.e. any Period t) due to the same game structure, except that all the amount that is stated above is discounted by δ^{t-1}.

APPENDIX 5: INSTRUCTIONS

Introduction Instructions for Lab Experiment

1. Introduction

Thank you for being here today. You are about to participate in an experiment in economic decision making. Please follow the instructions carefully. At any time, please feel free to raise your hand if you have a question. At the end of today's session, you will be paid your earnings privately and in cash.

You have been randomly assigned an ID number for this experiment. You will never be asked to reveal your identity to anyone. Your name will never be associated with any of your decisions. In order to keep your decisions private, please do not reveal your choices or otherwise communicate with any other participant. Importantly, please refrain from verbally reacting to events that occur during the experiment. While you are welcome to ask questions as we read the instructions, please refrain from suggesting what choices you or others should make as this may compromise the scientific value of the experiment.

Today's session consists of three parts: Questionnaire 1, Experiment 1, and Questionnaire 2. Your inputs for Questionnaire 1 are irrelevant to the following experiment. Experiment 1 consists of a series of negotiation games. Here, you will earn money based on decisions made during the experiment. Finally, we will conclude with Questionnaire 2.

We will now begin Questionnaire 1. If you will, please double-click the green leaf icon in the middle of your screen. Please only double-click it **once**. Afterwards, a window may pop up. If it does, please click "Run". When this is done successfully, you will see a grey screen with a tree and a leaf icon. Once you see this screen, please wait for further instruction.

Instructions for Main Experiment

1. Introduction

During Experiment 1, you will earn money based on decisions you make in a series of negotiation games. Decisions in each game are independent of one another, meaning your decisions in one negotiation game will not impact results in any other negotiation games. The number of games you will play is uncertain, meaning you will not know the total number of games in this session. At some point during the experiment, we will switch certain condition and you will be notified. We will play through one practice round before beginning the "real" games. Earnings from the practice round will not be included in your total earnings.

2. Experiment 1

For each negotiation game, you will be randomly paired with another participant. This pairing will stay the same within the current game and be randomly re-assigned for each following game. You will not know the identity of your partner.

You and your partner represent two firms and negotiate to split the profit of a contract, valued initially at **10,000 *ECU***. To do this, you will participate in a series of negotiation rounds whereby

you might make offers and counteroffers over multiple periods. However, each time you advance to another period of negotiation, the profit of the contract will decrease by 10%. Therefore, the contract will lose 10% of its value for each additional period of negotiation until you both agree on a split.

Below we have provided an example table of the profit of the contract over periods in Game 1. The current value of the contract will be displayed on your decision screen during each round of negotiation.

Period # of Game 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	…
Contract profit	10,000	9,000	8,100	7290	6561	5905	5315	4784	4307	3876	…

Note that you will go through multiple games. Also note that the exchange rate of ECU to USD is 0.0008.

3. Negotiation decisions

At the beginning of each game, one member of your group (you or your partner) will be randomly assigned as a **proposer** and the other as a **receiver**. Notice the assignment of the roles (proposer and receiver) will be randomly determined before each period (within a game) **and** each new Game. In other words, on average each participant has equal chance of being the proposer or receiver throughout the session.

Additionally, both of you have outside options for the contract—if the receiver rejects the proposer's offer and wants to quit the negotiation for the contract, both players will take their outside options (in ECU). Your outside option will be randomly assigned at the beginning of each game. Notice you might have a different outside option than your partner. You and your partner's outside options will be known to each other. Furthermore, the value of outside options decreases by 10% for each additional negotiation period, within a game.

Therefore, both the contract and your outside options decrease in value (by 10%) for each additional stage of negotiation.

The proposer's decision

The proposer goes first and determines how to split the profit of the contract with the other member. The amount proposed to both members should add up to the profit of the contract in the current period.

The receiver's decision

The receiver waits for and responds to the proposer's offer. There are three ways to respond to the offer:

(1) **Accept the offer**. In this case, both members receive the sum of amounts stated in the offer as the earnings for this game, and the contract is resolved. No further decisions will be made during this game.

(2) **Reject the offer**. In this case, both members get the sum of their respective outside options (displayed on the screen) as the earnings for this game. And this ends the negotiation process for the contract. No further decisions will be made during this game.

(3) **Continue bargaining**. In this case, negotiation over the contract will advance to the next period. No earnings are gained by either player at this point. Additionally, the contract

value and outside option values are reduced by 10%. Further, the roles of the proposer/receiver will be randomly reassigned for the next period. The newly assigned proposer will make decisions to split the profit. The newly assigned receiver will have the 3 options listed here and above.

The negotiation can last for a number of periods until one of the following happens: (1) the offer on the contract is accepted (2) the negotiation is stopped, and the outside options are taken (3) the profit of the contract has become negligible, determined by the system. In this case, both you and your partner receive no profit from the contract **or** your outside options. You will not know how many periods the game will go until the contract is considered negligible.

Calculation examples

Below we present a practice example to make sure that you understand the payoff structure for yourself and your partner. This following scenario features a negotiation over a contract, mimicking the actual experiment: there will be one contract per game, and you will receive the final value of your contract decision.

Scenario:

Suppose you are the proposer in **Period 1**. For the contract, you and your partner are given outside options of (**3000**, **4000**) ECU respectively. The contract has an initial profit of **10,000** ECU.
Further, suppose you allocate **7500** ECU to yourself and **2500** ECU to your partner:

- If your partner accepts the offer, you will get ____ ECU while your partner will get ____ ECU;
- If your partner rejects the offer and quits the negotiation, you will get ____ ECU while your partner will get ____ ECU.

Furthering the scenario:

Suppose your partner chooses to continue bargaining. Negotiation continues.
In **Period 2**, suppose you are randomly assigned as the receiver and your partner as the proposer. The contract has a present profit of 10000 ECU * (1-10%) = 10000*(.9) = **9000** ECU. The outside options also fall by 10%, i.e., (**2700, 3600**) ECU for you and your partner.

- Suppose your partner allocates **5000** ECU to herself, and she would allocate _____ ECU to you.
- If you accept the offer, you will get _____ ECU and your partner will get _____ ECU; the current game ends.
- If you reject the offer, you will get ____ ECU and your partner will get ____ ECU; the current game ends.
- If you choose to continue bargaining, you two will enter **Period 3**. In Period 3, the new contract value will be 9000 ECU * (1-10%) = **8100** ECU. Your outside option will be 2700*(.9) = **2430** ECU. Your partner's outside option will be 3600*(.9) = **3240** ECU. And so forth, as long as the randomized receiver chooses to continue bargaining and the contract remains above the negligible level. If the negotiation process continues so that the contract is deemed negligible, both you and your partner receive **ZERO** ECU.

Summary:

The proposer makes offers over the split of a contract and the receiver has three options to take, accept, reject and take outside options, or continue bargaining. For each period within a game,

both members are equally likely to be a proposer or receiver. The value of the contract and outside options is reduced by 10% over each additional period. You will see the current value of the contract and outside options on the screen each time you need to make a decision. It will be important for you to look at this information before making a decision, either as a proposer or a receiver.
After you and your partner reach agreement or take outside options, the current game ends. All participants in this room will be randomly re-matched to a **different** partner for a new game.
Please note that, sometimes when you and your partner finish the current game, you have to wait for the other participants in the room to finish their games. Please **sit quietly** while waiting for the next game to start.

Now ready for the experiment!
At this time, if you have questions about the instructions or procedures, please raise your hand. If not, we will begin shortly with the practice game.

CONCLUSION

This dissertation consists of three essays, investigating decision-making in buyer-supplier exchanges. Specific decision-making is investigated as the exchange is situated within either a normal mode of operations or a disrupted mode; and each is evaluated in terms of contextual influences. Essay 1 provides insights regarding buyers' reactions to supply chain disruptions as a function of buyers' attributional processes and suppliers' recovery actions. One key finding of Essay 1 lies in the disruption causes' significant role—depending on whether the cause is within the supplier organization or due to *force majeure*, buyers' reactions vary distinctly. In response to this finding, Essay 2 focuses on supplier-induced disruptions; a contingency framework demonstrates when buyers would perceive suppliers' recovery as satisfactory in response to supplier-induced disruptions. Both the disruption's severity and the uncertainty within the supply chain have significant shaping effects. While Essays 1 and 2 focus on the focal exchanges' disrupted mode, Essay 3 investigates power non-use in the context of multimarket buyer-supplier negotiations and identifies two scenarios pertaining to the multimarket context leading to power non-use.

In the future, this research area will present more opportunities. For instance, it will be interesting to take a more evolutionary perspective and study the changes in decision-making as buyer-supplier exchanges go from the normal mode to the disrupted mode and recover from the disrupted mode to return to the normal mode. In addition, a cross-culture perspective may be worthy of future investigation. Essay 1 discusses a US sample while Essay 2 discusses a Chinese sample; future research could focus on the cross-cultural difference in terms of buyers' reactions and suppliers' recovery. Furthermore, the multimarket context studied in Essay 3 is still emerging. In addition to the power dynamics, other relational dynamics could benefit from future research.

LIST OF REFERENCES

Adams, J. S. 1965. Inequity in social exchange. In L. Berkowitz (Ed.), ***Advances in experimental social psychology***, Vol. 2: 267–299. New York: Academic Press.
Aldrich, H. E., & Pfeffer, J. 1976. Environments of organizations. ***Annual review of sociology***, 2(1): 79–105.
Anand, K. S., & Aron, R. 2003. Group buying on the web: A comparison of price-discovery mechanisms. ***Management Science***, 49(11): 1546–1562.
Anand, P., & Stern, L. W. 1985. A sociopsychological explanation for why marketing channel members relinquish control. ***Journal of Marketing Research***: 365–376.
Anbarci, N., & Feltovich, N. 2013. How sensitive are bargaining outcomes to changes in disagreement payoffs? ***Experimental Economics***, 16(4): 560–596.
Andreoni, J., Kuhn, M. A., & Sprenger, C. 2015. Measuring time preferences: A comparison of experimental methods. ***Journal of Economic Behavior & Organization***, 116: 451–464.
Artz, K. W., & Brush, T. H. 2000. Asset specificity, uncertainty and relational norms: an examination of coordination costs in collaborative strategic alliances. ***Journal of Economic Behavior & Organization***, 41(4): 337-362.
Bascle, G. 2008. Controlling for endogeneity with instrumental variables in strategic management research. ***Strategic Organization***, 6(3): 285–327.
Beer, R., Ahn, H.-S., & Leider, S. 2017. Can trustworthiness in a supply chain be signaled? ***Management Science***, 64(9): 3974–3994.
Benton, W. C., & Maloni, M. 2005. The influence of power driven buyer/seller relationships on supply chain satisfaction. ***Journal of Operations Management***, 23(1): 1–22.
Bercovitz, J., Jap, S. D., & Nickerson, J. A. 2006. The Antecedents and Performance Implications of Cooperative Exchange Norms. ***Organization Science***, 17(6): 724-740.
Bettman, J. R., & Weitz, B. A. 1983. Attributions in the board room: Causal reasoning in corporate annual reports. ***Administrative Science Quarterly***: 165–183.
Bies, R. J. 1986. Interactional justice, ***The Oxford Handbook of Justice in the Workplace***.
Bies, R. J., & Moag, J. S. 1986. Interactional justice: Communications criteria of fairness. In R. Lewicki, B. Sheppard, & M. H. Bazerman (Eds.), ***Research on negotiations in organisations***: 57–79. Greenwich, CT: JAI Press.
Binmore, K., Morgan, P., Snaked, A., & Sutton, J. 1991. Do people exploit their bargaining power? An experimental study. ***Games and Economic Behavior***, 3(3): 295–322.
Binmore, K., Shaked, A., & Sutton, J. 1988. A further test of noncooperative bargaining theory: Reply. ***The American Economic Review***, 78(4): 837–839.
Binmore, K., Shared, A., & Sutton, J. 1989. An outside option experiment. ***The Quarterly Journal of Economics***, 104(4): 753–770.
Binmore, K., Swierzbinski, J., Hsu, S., & Proulx, C. 1993. Focal points and bargaining. ***International Journal of Game Theory***, 22(4): 381–409.
Binmore, K., Swierzbinski, J., & Tomlinson, C. 2007. An experimental test of Rubinstein's bargaining model.
Bitner, M. J., Booms, B. H., & Tetreault, M. S. 1990. The service encounter: Diagnosing favorable and unfavorable incidents. ***Journal of Marketing***, 54(1): 71–84.
Bode, C., & Wagner, S. M. 2015. Structural drivers of upstream supply chain complexity and the frequency of supply chain disruptions. ***Journal of Operations Management***, 36: 215–228.

Bode, C., Wagner, S. M., Petersen, K. J., & Ellram, L. M. 2011. Understanding responses to supply chain disruptions: Insights from information processing and resource dependence perspectives. ***Academy of Management Journal***, 54(4): 833–856.

Bolino, M. C., Kacmar, K. M., Turnley, W. H., & Gilstrap, J. B. 2008. A multi-level review of impression management motives and behaviors. ***Journal of Management***, 34(6): 1080–1109.

Bolton, G. E. 1991. A comparative model of bargaining: Theory and evidence. ***American Economic Review***: 1096–1136.

Bolton, G. E., & Ockenfels, A. 2000. ERC: A theory of equity, reciprocity, and competition. ***American Economic Review***, 90(1): 166–193.

Bottom, W. P., Gibson, K., Daniels, S. E., & Murnighan, J. K. 2002. When talk is not cheap: Substantive penance and expressions of intent in rebuilding cooperation. ***Organization Science***, 13(5): 497–513.

Bourgeois, L. J. 1980. Strategy and environment: A conceptual integration. ***Academy of Management Review***, 5(1): 25–39.

Bourgeois, L. J. 1981. On the measurement of organizational slack. ***Academy of Management Review***, 6(1): 29–39.

Bowen, D. E., & Ostroff, C. 2004. Understanding HRM-Firm Performance Linkages: The Role of the "Strength" of the HRM System. ***The Academy of Management Review***, 29(2): 203-221.

Bowersox, D. J., Closs, D. J., & Stank, T. P. 1999. ***21st century logistics: Making supply chain integration a reality***.

Bowling, N. A., & Beehr, T. A. 2006. Workplace harassment from the victim's perspective: a theoretical model and meta-analysis. ***Journal of Applied Psychology***.

Brockhaus, S., Kersten, W., & Knemeyer, A. M. 2013. Where do we go from here? Progressing sustainability implementation efforts across supply chains. ***Journal of Business Logistics***, 34(2): 167–182.

Camerer, C. F. 2011. ***Behavioral game theory: Experiments in strategic interaction***: Princeton University Press.

Cantor, D. E., Macdonald, J. R., & Crum, M. R. 2011. The influence of workplace justice perceptions on commercial driver turnover intentions. ***Journal of Business Logistics***, 32(3): 274–286.

Carter, C. R., & Stevens, C. K. 2007. Electronic reverse auction configuration and its impact on buyer price and supplier perceptions of opportunism: A laboratory experiment. ***Journal of Operations Management***, 25(5): 1035–1054.

Casciaro, T., & Piskorski, M. J. 2005. Power imbalance, mutual dependence, and constraint absorption: A closer look at resource dependence theory. ***Administrative Science Quarterly***, 50(2): 167–199.

Child, J. 1972. Organizational structure, environment and performance: The role of strategic choice. ***Sociology***, 6(1): 1–22.

Choi, T. Y., & Krause, D. R. 2006. The supply base and its complexity: Implications for transaction costs, risks, responsiveness, and innovation. ***Journal of Operations Management***, 24(5): 637–652.

Clapham, S. E., & Schwenk, C. R. 1991. Self‐serving attributions, managerial cognition, and company performance. ***Strategic Management Journal***, 12(3): 219–229.

Cohen, J. 1960. A coefficient of agreement for nominal scales. ***Educational and Psychological Measurement***, 20(1): 37–46.

Colquitt, J. A., & Rodell, J. B. 2011. Justice, trust, and trustworthiness: A longitudinal analysis integrating three theoretical perspectives. ***Academy of Management Journal***, 54(6): 1183–1206.

Colquitt, J. A., Scott, B. A., & LePine, J. A. 2007. Trust, trustworthiness, and trust propensity: A meta-analytic test of their unique relationships with risk taking and job performance. ***Journal of Applied Psychology***: 909–927.

Conlon, D. E., & Murray, N. M. 1996. Customer perceptions of corporate responses to product complaints: The role of explanations. ***Academy of Management Journal***, 39(4): 1040–1056.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. 2011a. Signaling theory: A review and assessment. ***Journal of Management***, 37(1): 39–67.

Connelly, B. L., Ketchen, D. J., & Slater, S. F. 2011b. Toward a "theoretical toolbox" for sustainability research in marketing. ***Journal of the Academy of Marketing Science***, 39(1): 86–100.

Cook, K. S., & Emerson, R. M. 1978. Power, equity and commitment in exchange networks. ***American Sociological Review***: 721–739.

Cox, A. 2001. Managing with power: Strategies for improving value appropriation from supply relationships. ***Journal of Supply Chain Management***, 37(1): 42–47.

Cox, A., Watson, G., Lonsdale, C., & Sanderson, J. 2004. Managing appropriately in power regimes: Relationship and performance management in 12 supply chain cases. ***Supply Chain Management: An International Journal***, 9(5): 357–371.

Craighead, C. W., Blackhurst, J., Rungtusanatham, M. J., & Handfield, R. B. 2007. The severity of supply chain disruptions: Design characteristics and mitigation capabilities. ***Decision Sciences***, 38(1): 131–156.

Craighead, C. W., Karwan, K. R., & Miller, J. L. 2004. The effects of severity of failure and customer loyalty on service recovery strategies. ***Production and Operations Management***, 13(4): 307–321.

Craighead, C. W., Ketchen, D. J., Dunn, K. S., & Hult, G. T. M. 2011. Addressing common method variance: Guidelines for survey research on information technology, operations, and supply chain management. ***IEEE Transactions on Engineering Management***, 58(3): 578–588.

Crook, T. R., & Combs, J. G. 2007. Sources and consequences of bargaining power in supply chains. ***Journal of Operations Management***, 25(2): 546–555.

Crook, T. R., Craighead, C. W., & Autry, C. W. 2017. Hold back or held back? The roles of constraint mitigation and exchange diffusion on power nonuse" in buyer–supplier exchanges. ***Journal of Supply Chain Management***, 53(2): 10–21.

Daft, R. L., & Weick, K. E. 1984. Toward a model of organizations as interpretation systems. ***Academy of Management Review***, 9(2): 284–295.

Davis, A. M., & Hyndman, K. 2018. Multidimensional bargaining and inventory risk in supply chains: An experimental study. ***Management Science***(Articles in advance): 1–19.

del Río-Lanza, A. B., Vázquez-Casielles, R., & Díaz-Martín, A. M. 2009. Satisfaction with service recovery: Perceived justice and emotional responses. ***Journal of Business Research***, 62(8): 775–781.

Dienesch, R. M., & Liden, R. C. 1986. Leader-Member Exchange Model of Leadership: A Critique and Further Development. ***The Academy of Management Review***, 11(3): 618-634.
Duncan, R. B. 1972. Characteristics of organizational environments and perceived environmental uncertainty. ***Administrative Science Quarterly***: 313–327.
Dutton, J. E., & Jackson, S. E. 1987. Categorizing strategic issues: Links to organizational action. ***Academy of Management Review***, 12(1): 76–90.
Eberly, M. B., Holley, E. C., Johnson, M. D., & Mitchell, T. R. 2011. Beyond internal and external: a dyadic theory of relational attributions. ***Academy of Management Review***, 36(4): 731–753.
Eckerd, S., & Handley, S. 2015. ***To err is human: A model of interorganizational violations and repair***. Paper presented at the Academy of Management Proceedings.
Eckerd, S., Hill, J., Boyer, K. K., Donohue, K., & Ward, P. T. 2013. The relative impact of attribute, severity, and timing of psychological contract breach on behavioral and attitudinal outcomes. ***Journal of Operations Management***, 31(7): 567–578.
Edwards, C. D. 1955. Conglomerate bigness as a source of power, ***Business concentration and price policy***: 331–359: Princeton University Press.
Egelhoff, W. G. 1982. Strategy and structure in multinational corporations: An information-processing approach. ***Administrative Science Quarterly***: 435–458.
Emerson, R. M. 1962. Power-dependence relations. ***American Sociological Review***: 31–41.
Enders, C. K., & Tofighi, D. 2007. Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. ***Psychological Methods***, 12(2): 121–138.
Ertogral, K., & Wu, S. D. 2001. A bargaining game for supply chain contracting.
Ferrari, B. (2015). Lumber Liquidators suspends all China sourced laminate flooring products. Retrieved from https://www.theferrarigroup.com/supply-chain-matters/2015/05/08/lumber-liquidators-suspends-all-china-sourced-laminate-flooring-products/
Fiksel, J. (2017). FROM RISK TO RESILIENCE: FIND AND OVERCOME YOUR COMPANY'S WEAKEST LINK. Retrieved from http://www.delivered.dhl.com/en/articles/2015/11/a-look-back-at-2015-the-top-10-supply-chain-disruptions.html
Fischbacher, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. ***Experimental Economics***, 10(2): 171–178.
Fischer, S., Güth, W., & Pull, K. 2007. Is there as-if bargaining? ***The Journal of Socio-Economics***, 36(4): 546–560.
Flanagan, J. C. 1954. The critical incident technique. ***Psychological Bulletin***, 51(4): 327–358.
Folkes, V. S. 1984. Consumer reactions to product failure: An attributional approach. ***Journal of Consumer Research***, 10(4): 398–409.
Ford, J. D. 1985a. The effects of causal attributions on decision makers' responses to performance downturns. ***Academy of Management Review***, 10(4): 770–786.
Ford, J. D. 1985b. The Effects of Causal Attributions on Decision Makers' Responses to Performance Downturns. ***The Academy of Management Review***, 10(4): 770-786.
Frazier, G. L., & Rody, R. C. 1991. The use of influence strategies in interfirm relationships in industrial product channels. ***Journal of Marketing***: 52–69.

Frederick, S. 2005. Cognitive reflection and decision making. ***The Journal of Economic Perspectives***, 19(4): 25–42.
Gillespie, N., & Dietz, G. 2009. Trust repair after an organization-level failure. ***Academy of Management Review***, 34(1): 127–145.
Goldsby, T. J., Michael Knemeyer, A., Miller, J. W., & Wallenburg, C. M. 2013. Measurement and moderation: Finding the boundary conditions in logistics and supply chain research. ***Journal of Business Logistics***, 34(2): 109–116.
Gosling, S. D., Rentfrow, P. J., & Swann, W. B. 2003. A very brief measure of the Big-Five personality domains. ***Journal of Research in Personality***, 37(6): 504–528.
Greenberg, J. 1990a. Looking fair vs. being fair: Managing impressions of organizational justice. ***Research in Organizational Behavior***, 12(1): 111–157.
Greenberg, J. 1990b. Organizational justice: Yesterday, today, and tomorrow. ***Journal of Management***, 16(2): 399–432.
Greenberg, J. 1993. Stealing in the name of justice: Informational and interpersonal moderators of theft reactions to underpayment inequity. ***Organizational behavior and human decision processes***, 54(1): 81–103.
Greene, W. H. 2012. ***Econometric Analysis*** (Seventh ed.). Boston, MA: Prentice Hall.
Greenhaus, J. H., & Beutell, N. J. 1985. Sources of Conflict between Work and Family Roles. ***The Academy of Management Review***, 10(1): 76-88.
Greimel, H. (2016). Toyota, Nissan idle 2 assembly plants in wake of earthquake. Retrieved from http://www.autonews.com/article/20160414/OEM01/160419920/toyota-idles-lexus-plant-to-assess-supply-chain-after-quake
Gremler, D. D. 2004. The critical incident technique in service research. ***Journal of Service Research***, 7(1): 65–89.
Greve, H. R., Baum, J. A. C., Mitsuhashi, H., & Rowley, T. J. 2010. Built to last but falling apart: Cohesion, friction, and withdrawal from interfirm alliances. ***Academy of Management Journal***, 53(2): 302–322.
Griffith, D. A., Harvey, M. G., & Lusch, R. F. 2006. Social exchange in supply chain relationships: The resulting benefits of procedural and distributive justice. ***Journal of Operations Management***, 24(2): 85–98.
Gulati, R., & Higgins, M. C. 2003. Which ties matter when? The contingent effects of interorganizational partnerships on IPO success. ***Strategic Management Journal***, 24(2): 127–144.
Gulati, R., & Sytch, M. 2007. Dependence asymmetry and joint dependence in interorganizational relationships: Effects of embeddedness on a manufacturer's performance in procurement relationships. ***Administrative Science Quarterly***, 52(1): 32–69.
Haans, R. F., Pieters, C., & He, Z. L. 2015. Thinking about U: Theorizing and testing U‐and inverted U‐shaped relationships in strategy research. ***Strategic Management Journal***, 37: 1177–1195.
Hambrick, D. C. 1982. Environmental scanning and organizational strategy. ***Strategic Management Journal***, 3(2): 159–174.
Hartmann, J., & Moeller, S. 2014. Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behavior. ***Journal of Operations Management***, 32(5): 281–294.

Heide, J. B., & Miner, A. S. 1992. The Shadow of the Future: Effects of Anticipated Interaction and Frequency of Contact on Buy-Seller Cooperation. ***Academy of Management Journal***, 35(2): 265-291.
Hendricks, K. B., & Singhal, V. R. 2003a. The effect of supply chain glitches on shareholder wealth. ***Journal of Operations Management***, 21(5): 501-522.
Hendricks, K. B., & Singhal, V. R. 2003b. The effect of supply chain glitches on shareholder wealth. ***Journal of Operations Management***, 21(5): 501–522.
Hendricks, K. B., & Singhal, V. R. 2005a. Association between supply chain glitches and operating performance. ***Management science***, 51(5): 695–711.
Hendricks, K. B., & Singhal, V. R. 2005b. An Empirical Analysis of the Effect of Supply Chain Disruptions on Long-Run Stock Price Performance and Equity Risk of the Firm. ***Production and Operations Management***, 14(1): 35-52.
Hendricks, K. B., & Singhal, V. R. 2005c. An empirical analysis of the effect of supply chain disruptions on long‐run stock price performance and equity risk of the firm. ***Production and Operations management***, 14(1): 35‐52.
Hendricks, K. B., Singhal, V. R., & Zhang, R. 2009. The effect of operational slack, diversification, and vertical relatedness on the stock market reaction to supply chain disruptions. ***Journal of Operations Management***, 27(3): 233–246.
Higgins, M. C., & Gulati, R. 2006. Stacking the deck: The effects of top management backgrounds on investor decisions. ***Strategic Management Journal***, 27(1): 1–25.
Hillman, A. J., Withers, M. C., & Collins, B. J. 2009. Resource dependence theory: A review. ***Journal of Management***, 35(6): 1404–1427.
Ho, T. H., Su, X., & Wu, Y. 2014. Distributional and peer‐induced fairness in supply chain contract design. ***Production and Operations Management***, 23(2): 161‐175.
Hofer, A. R., Knemeyer, A. M., & Murphy, P. R. 2012. The roles of procedural and distributive justice in logistics outsourcing relationships. ***Journal of Business Logistics***, 33(3): 196–209.
Holmes Jr, R. M., Bromiley, P., Devers, C. E., Holcomb, T. R., & McGuire, J. B. 2011. Management theory applications of prospect theory: Accomplishments, challenges, and opportunities. ***Journal of Management***, 37(4): 1069–1107.
Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. 2000. Strategy in emerging economies. ***Academy of Management Journal***, 43(3): 249–267.
Hult, G. T. M., Craighead, C. W., & Ketchen, D. J. 2010. Risk uncertainty and supply chain decisions: A real options perspective. ***Decision Sciences***, 41(3): 435–458.
Hult, G. T. M., Ketchen, D. J., & Arrfelt, M. 2007. Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development. ***Strategic Management Journal***, 28(10): 1035–1052.
Hult, G. T. M., Ketchen, D. J., & Nichols, E. L. 2002. An examination of cultural competitiveness and order fulfillment cycle time within supply chains. ***Academy of Management Journal***, 45(3): 577–586.
Hult, G. T. M., Ketchen, D. J., & Slater, S. F. 2004. Information processing, knowledge development, and strategic supply chain performance. ***Academy of Management Journal***, 47(2): 241–253.
Hunt, S. D. 1991. ***Modern marketing theory: Critical issues in the philosophy of marketing science***: South-Western Pub.

Hunt, S. D., & Nevin, J. R. 1974. Power in a channel of distribution: Sources and consequences. ***Journal of Marketing Research***: 186–193.
Jackson, S. E., & Dutton, J. E. 1988. Discerning threats and opportunities. ***Administrative Science Quarterly***: 370–387.
Jacobs, B. W., & Singhal, V. R. 2017. The effect of the Rana Plaza disaster on shareholder wealth of retailers: Implications for sourcing strategies and supply chain governance. ***Journal of Operations Management***, 49: 52-66.
Jap, S. D. 2007. The impact of online reverse auction design on buyer–supplier relationships. ***Journal of Marketing***, 71(1): 146–159.
Jap, S. D., & Anderson, E. 2003. Safeguarding Interorganizational Performance and Continuity under Ex Post Opportunism. ***Management Science***, 49(12): 1684-1701.
Jayachandran, S., Gimeno, J., & Varadarajan, P. R. 1999. The theory of multimarket competition: A synthesis and implications for marketing strategy. ***Journal of Marketing***, 63(3): 49–66.
Jiang, B., Belohlav, J. A., & Young, S. T. 2007. Outsourcing impact on manufacturing firms' value: Evidence from Japan. ***Journal of Operations Management***, 25(4): 885–900.
Jing, X., & Xie, J. 2011. Group buying: A new mechanism for selling through social interactions. ***Management Science***, 57(8): 1354–1372.
Jones, E. E., & Davis, K. E. 1965. From acts to dispositions the attribution process in person perception. ***Advances in Experimental Social Psychology***, 2: 219–266.
Kagel, J. H., & Roth, A. E. 1995. ***The Handbook of Experimental Economics***. Princeton, NJ: Princeton University Press.
Kahneman, D., Knetsch, J. L., & Thaler, R. H. 1990. Experimental tests of the endowment effect and the Coase theorem. ***Journal of Political Economy***, 98(6): 1325–1348.
Kahneman, D., & Tversky, A. 1979. Prospect theory: An analysis of decision under risk. ***Econometrica***, 47(2): 263–291.
Katok, E., & Pavlov, V. 2013. Fairness in supply chain contracts: A laboratory study. ***Journal of Operations Management***, 31(3): 129–137.
Kelley, H. H. 1967. ***Attribution theory in social psychology***. Paper presented at the Nebraska symposium on motivation, Lincoln.
Kelley, H. H. 1973. The processes of causal attribution. ***American Psychologist***, 28(2): 107.
Kelly, H. 1971. Attribution in Social Interaction. In E. E. e. a. Jones (Ed.), ***Attribution, Perceiving the Causes of Behavior***: 1-26. Morristown, NJ: General Learning Press.
Ketchen, D. J., Crook, T. R., & Craighead, C. W. 2014. From supply chains to supply ecosystems: implications for strategic sourcing research and practice. ***Journal of Business Logistics***, 35(3): 165–171.
Ketchen, D. J., & Hult, G. T. M. 2007. Bridging organization theory and supply chain management: The case of best value supply chains. ***Journal of Operations Management***, 25(2): 573–580.
Ketchen, D. J., Wowak, K. D., & Craighead, C. W. 2014. Resource gaps and resource orchestration shortfalls in supply chain management: The case of product recalls. ***Journal of Supply Chain Management***, 50(3): 6–15.
Ketokivi, M., & McIntosh, C. N. 2017. Addressing the endogeneity dilemma in operations management research: Theoretical, empirical, and pragmatic considerations. ***Journal of Operations Management***, 52: 1–14.

Kim, P. H., Dirks, K. T., Cooper, C. D., & Ferrin, D. L. 2006. When more blame is better than less: The implications of internal vs. external attributions for the repair of trust after a competence-vs. integrity-based trust violation. ***Organizational Behavior and Human Decision Processes***, 99(1): 49–65.

Kim, W. C., & Mauborgne, R. A. 1996. Procedural justice and managers' in-role and extra-role behavior: The case of the multinational. ***Management Science***, 42(4): 499–515.

King, A. A., Lenox, M. J., & Terlaak, A. 2005. The strategic use of decentralized institutions: Exploring certification with the ISO 14001 management standard. ***Academy of Management Journal***, 48(6): 1091–1106.

Klein, H. J. 1989. An Integrated Control Theory Model of Work Motivation. ***The Academy of Management Review***, 14(2): 150-172.

Kleindorfer, P. R., & Saad, G. H. 2005. Managing Disruption Risks in Supply Chains. ***Production and Operations Management***, 14(1): 53-68.

Korsgaard, M. A., Schweiger, D. M., & Sapienza, H. J. 1995. Building commitment, attachment, and trust in strategic decision-making teams: The role of procedural justice. ***Academy of Management journal***, 38(1): 60–84.

Kumar, N., Scheer, L. K., & Steenkamp, J.-B. E. 1995. The effects of supplier fairness on vulnerable resellers. ***Journal of Marketing Research***: 54–65.

Kumar, R., & Nti, K. O. 1998. Differential learning and interaction in alliance dynamics: A process and outcome discrepancy model. ***Organization Science***, 9(3): 356–367.

Lampel, J., Lant, T., & Shamsie, J. 2000. Balancing act: Learning from organizing practices in cultural industries. ***Organization Science***, 11(3): 263–269.

Larcker, D. F., Larcker, S. M., & Tayan, B. 2014. Lululemon: A sheer debacle in risk management.

Leblebici, H., & Salancik, G. R. 1981. Effects of environmental uncertainty on information and decision processes in banks. ***Administrative Science Quarterly***, 26(4): 578–596.

Lee, P. M. 2001. What's in a name. com?: The effects of '. com'name changes on stock prices and trading activity. ***Strategic Management Journal***, 22(8): 793–804.

Leider, S., & Lovejoy, W. S. 2016. Bargaining in supply chains. ***Management Science***, 62(10): 3039–3058.

Lepine, J. A., & Van Dyne, L. 2001. Peer responses to low performers: An attributional model of helping in the context of groups. ***Academy of Management Review***, 26(1): 67–84.

Leventhal, G. S. 1980a. What should be done with equity theory?, ***Social exchange***: 27-55: Springer.

Leventhal, G. S. 1980b. What should be done with equity theory? New approaches to the study of fairness in social relationships. In K. Gergen, M. Greenberg, & R. Willis (Eds.), ***Social exchange: Advances in theory and research***: 27-55. New York: Plenum.

Lewicki, R. J., & Bunker, B. B. 1996. Developing and maintaining trust in work relationships. In R. M. Kramer, & T. R. Tyler (Eds.), ***Trust in organizations: Frontiers of theory and research***: 114–139. Thousand Oaks, CA: Sage.

Liao, H. 2007. Do it right this time: The role of employee service recovery performance in customer-perceived justice and customer loyalty after service failures. ***Journal of Applied Psychology***, 92(2): 475–489.

Lind, E. A., & Tyler, T. R. 1988. ***The social psychology of procedural justice***: Springer Science & Business Media.

Liu, Y., Huang, Y., Luo, Y., & Zhao, Y. 2012. How does justice matter in achieving buyer–supplier relationship performance? ***Journal of Operations Management***, 30(5): 355–367.
Liu, Y., Luo, Y., & Liu, T. 2009. Governing buyer–supplier relationships through transactional and relational mechanisms: evidence from China. ***Journal of Operations Management***, 27(4): 294–309.
Lumineau, F., & Henderson, J. E. 2012. The influence of relational experience and contractual governance on the negotiation strategy in buyer–supplier disputes. ***Journal of Operations Management***, 30(5): 382–395.
Luo, Y. 2007a. Are joint venture partners more opportunistic in a more volatile environment? ***Strategic Management Journal***, 28(1): 39–60.
Luo, Y. 2007b. The independent and interactive roles of procedural, distributive, and interactional justice in strategic alliances. ***Academy of Management Journal***, 50(3): 644–664.
Luo, Y. 2008. Procedural fairness and interfirm cooperation in strategic alliances. ***Strategic Management Journal***, 29(1): 27–46.
Lusch, R. F., & Brown, J. R. 1982. A modified model of power in the marketing channel. ***Journal of Marketing Research***: 312–323.
Maloni, M., & Benton, W. C. 2000. Power influences in the supply chain. ***Journal of Business Logistics***, 21(1): 49–74.
McColl-Kennedy, J. R., & Sparks, B. A. 2003. Application of fairness theory to service failures and service recovery. ***Journal of Service Research***, 5(3): 251–266.
McGrath, R. G., Chen, M.-J., & MacMillan, I. C. 1998. Multimarket maneuvering in uncertain spheres of influence: Resource diversion strategies. ***Academy of Management Review***, 23(4): 724–740.
Meindl, J. R., & Ehrlich, S. B. 1987. The Romance of Leadership and the Evaluation of Organizational Performance. ***The Academy of Management Journal***, 30(1): 91-109.
Meyer, A. D., Brooks, G. R., & Goes, J. B. 1990. Environmental jolts and industry revolutions: Organizational responses to discontinuous change. ***Strategic Management Journal***: 93–110.
Miller, J. L., Craighead, C. W., & Karwan, K. R. 2000. Service recovery: A framework and empirical investigation. ***Journal of Operations Management***, 18(4): 387-400.
Mintzberg, H. 1973. The nature of managerial work.
Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. 2015. ***Purchasing and supply chain management***: Cengage Learning.
Moore, J. E. 2000. Why is This Happening? A Causal Attribution Approach to Work Exhaustion Consequences. ***The Academy of Management Review***, 25(2): 335-349.
Moorman, C., Zaltman, G., & Deshpande, R. 1992. Relationships between providers and users of market research: The dynamics of trust within and between organizations. ***Journal of Marketing Research***, 29(3): 314–328.
Morgeson, F. P., Mitchell, T. R., & Liu, D. 2015. Event system theory: An event-oriented approach to the organizational sciences. ***Academy of Management Review***, 40(4): 515–537.
Nadler, J., Thompson, L., & Boven, L. V. 2003. Learning negotiation skills: Four models of knowledge creation and transfer. ***Management Science***, 49(4): 529–540.

Nagarajan, M., & Bassok, Y. 2008. A bargaining framework in supply chains: The assembly problem. ***Management Science***, 54(8): 1482–1496.

Nair, A., Narasimhan, R., & Bendoly, E. 2011. Coopetitive buyer–supplier relationship: An investigation of bargaining power, relational context, and investment strategies. ***Decision Sciences***, 42(1): 93–127.

Narasimhan, R., Nair, A., Griffith, D. A., Arlbjørn, J. S., & Bendoly, E. 2009. Lock-in situations in supply chains: A social exchange theoretic study of sourcing arrangements in buyer–supplier relationships. ***Journal of Operations Management***, 27(5): 374–389.

Narasimhan, R., Narayanan, S., & Srinivasan, R. 2013. An investigation of justice in supply chain relationships and their performance impact. ***Journal of Operations Management***, 31(5): 236–247.

Narayanan, A., & Moritz, B. B. 2015. Decision making and cognition in multi‐echelon supply chains: An experimental study. ***Production and Operations Management***, 24(8): 1216‐1234.

Nash, J. F. 1950. The bargaining problem. ***Econometrica: Journal of the Econometric Society***: 155–162.

Ndofor, H. A., & Levitas, E. 2004. Signaling the strategic value of knowledge. ***Journal of Management***, 30(5): 685–702.

Neale, M. A., & Bazerman, M. H. 1985. The effects of framing and negotiator overconfidence on bargaining behaviors and outcomes. ***Academy of Management Journal***, 28(1): 34–49.

Netemeyer, R. G., Boles, J. S., McKee, D. O., & McMurrian, R. 1997. An investigation into the antecedents of organizational citizenship behaviors in a personal selling context. ***Journal of Marketing***: 85–98.

Nyaga, G. N., Lynch, D. F., Marshall, D., & Ambrose, E. 2013. Power asymmetry, adaptation and collaboration in dyadic relationships involving a powerful partner. ***Journal of Supply Chain Management***, 49(3): 42–65.

Nyaga, G. N., Whipple, J. M., & Lynch, D. F. 2010. Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ? ***Journal of Operations Management***, 28(2): 101-114.

Ocasio, W. 1997. Towards an attention-based view of the firm. ***Strategic Management Journal***: 187–206.

Oliver, R. L. 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. ***Journal of Marketing Research***: 460–469.

Osborne, M. J. 2004. ***An introduction to game theory***. New York, NY: Oxford university press.

Park, N. K., & Mezias, J. M. 2005. Before and after the technology sector crash: The effect of environmental munificence on stock market response to alliances of e-commerce firms. ***Strategic Management Journal***, 26(11): 987–1007.

Patriotta, G., & Gruber, D. A. 2015. Newsmaking and sensemaking: Navigating temporal transitions between planned and unexpected events. ***Organization Science***, 26(6): 1574–1592.

Perkins, S. J., & Hendry, C. 2005. Ordering top pay: Interpreting the signals. ***Journal of Management Studies***, 42(7): 1443–1468.

Perrow, C. 2011. ***Normal accidents: Living with high risk technologies***: Princeton University Press.

Pfeffer, J., & Salancik, G. R. 1978. ***The external control of organisations: A resource dependence perspective***. New York: Harper and Row.
Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. ***Journal of Applied Psychology***, 88(5): 879–903.
Ponomarov, S. Y., & Holcomb, M. C. 2009. Understanding the concept of supply chain resilience. ***The International Journal of Logistics Management***, 20(1): 124–143.
Poppo, L., Zhou, K. Z., & Ryu, S. 2008. Alternative origins to interorganizational trust: An interdependence perspective on the shadow of the past and the shadow of the future. ***Organization Science***, 19(1): 39–55.
Powell, T. C., Lovallo, D., & Caringal, C. 2006. Causal ambiguity, management perception, and firm performance. ***Academy of Management Review***, 31(1): 175–196.
Raudenbush, S. W. 1989. Centering" predictors in multilevel analysis: Choices and consequences. ***Multilevel Modelling Newsletter***, 1(2): 10–12.
Raudenbush, S. W., & Bryk, A. S. 2002. ***Hierarchical linear models: Applications and data analysis methods***: Sage.
Reimann, F., Kosmol, T., & Kaufmann, L. 2017a. Responses to supplier‐induced disruptions: A fuzzy‐set analysis. ***Journal of Supply Chain Management***, 53(4): 37‐66.
Reimann, F., Shen, P., & Kaufmann, L. 2017b. Multimarket contact and the use of power in buyer–supplier relationships. ***Journal of Business Logistics***, 38(1): 18–34.
Ren, H., & Gray, B. 2009. Repairing relationship conflict: How violation types and culture influence the effectiveness of restoration rituals. ***Academy of Management Review***, 34(1): 105–126.
Richardson, H. A., Simmering, M. J., & Sturman, M. C. 2009. A tale of three perspectives: Examining post hoc statistical techniques for detection and correction of common method variance. ***Organizational Research Methods***, 12(4): 762–800.
Roberts, K. H. 1990. Some characteristics of one type of high reliability organization. ***Organization Science***, 1(2): 160–176.
Rubinstein, A. 1982. Perfect equilibrium in a bargaining model. ***Econometrica: Journal of the Econometric Society***: 97–109.
Salancik, G. R., & Meindl, J. R. 1984. Corporate attributions as strategic illusions of management control. ***Administrative Science Quarterly***, 29(2): 238–254.
Sanders, W., & Boivie, S. 2004. Sorting things out: Valuation of new firms in uncertain markets. ***Strategic Management Journal***, 25(2): 167–186.
Scott, W. R., & Davis, G. F. 2015. ***Organizations and organizing: Rational, natural and open systems perspectives***: Routledge.
Shaked, A., & Sutton, J. 1984. Involuntary unemployment as a perfect equilibrium in a bargaining model. ***Econometrica: Journal of the Econometric Society***: 1351–1364.
Shapiro, K. L., Raymond, J. E., & Arnell, K. M. 1994. Attention to visual pattern information produces the attentional blink in rapid serial visual presentation. ***Journal of Experimental psychology: Human perception and performance***, 20(2): 357–371.
Sheffi, Y., & Rice Jr, J. B. 2005. A supply chain view of the resilient enterprise. ***MIT Sloan management review***, 47(1): 41–48.

Shiffrin, R. M., & Schneider, W. 1977. Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. ***Psychological Review***, 84(2): 127–190.

Shimizu, K. 1999. ***Imperfect learning: What does an organization learn from its mistake?*** Paper presented at the Academy of Management Proceedings.

Shipilov, A. V. 2009. Firm scope experience, historic multimarket contact with partners, centrality, and the relationship between structural holes and performance. ***Organization Science***, 20(1): 85–106.

Siggelkow, N., & Levinthal, D. A. 2003. Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. ***Organization Science***, 14(6): 650–669.

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. 2007. Managing firm resources in dynamic environments to create value: Looking inside the black box. ***Academy of Management Review***, 32(1): 273–292.

Smith, A. K., & Bolton, R. N. 1998. An experimental investigation of customer reactions to service failure and recovery encounters: Paradox or peril? ***Journal of Service Research***, 1(1): 65–81.

Smith, A. K., Bolton, R. N., & Wagner, J. 1999. A model of customer satisfaction with service encounters involving failure and recovery. ***Journal of Marketing Research***: 356–372.

Smith, J. S., Karwan, K. R., & Markland, R. E. 2009. An empirical examination of the structural dimensions of the service recovery system. ***Decision Sciences***, 40(1): 165–186.

Spence, M. 1973. Job market signaling. ***The Quarterly Journal of Economics***, 87(3): 355–374.

Spence, M. 2002. Signaling in retrospect and the informational structure of markets. ***American Economic Review***, 92(3): 434–459.

Srinivasan, R., & Swink, M. 2015. Leveraging supply chain integration through planning comprehensiveness: An organizational information processing theory perspective. ***Decision Sciences***, 46(5): 823–861.

Steenkamp, J.-B. E. M., & Baumgartner, H. 1998. Assessing measurement invariance in cross-national consumer research. ***Journal of Consumer Research***, 25(1): 78–90.

Stuhlmacher, A. F., & Walters, A. E. 1999. Gender differences in negotiation outcome: A meta‐analysis. ***Personnel Psychology***, 52(3): 653‐677.

Sutton, J. 1986. Non-cooperative bargaining theory: An introduction. ***The Review of Economic Studies***, 53(5): 709–724.

Thibaut, J. W., & Walker, L. 1975. ***Procedural justice: A psychological analysis***. Hillsdale, NJ/New York: L. Erlbaum Associates.

Thomas, J. B., Clark, S. M., & Gioia, D. A. 1993. Strategic sensemaking and organizational performance: Linkages among scanning, interpretation, action, and outcomes. ***Academy of Management Journal***, 36(2): 239–270.

Thomas, K. W., & Velthouse, B. A. 1990. Cognitive Elements of Empowerment: An "Interpretive" Model of Intrinsic Task Motivation. ***The Academy of Management Review***, 15(4): 666-681.

Tomlin, B. 2006. On the value of mitigation and contingency strategies for managing supply chain disruption risks. ***Management Science***, 52(5): 639–657.

Tomlinson, E. C., & Mayer, R. C. 2009. The role of causal attribution dimensions in trust repair. ***Academy of Management Review***, 34(1): 85–104.

Trautmann, G., Turkulainen, V., Hartmann, E., & Bals, L. 2009. Integration in the global sourcing organization—An information processing perspective. ***Journal of Supply Chain Management***, 45(2): 57–74.
Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. ***Administrative Science Quarterly***, 42(1): 35–67.
Vaidyanathan, R., & Aggarwal, P. 2003. Who is the fairest of them all? An attributional approach to price fairness perceptions. ***Journal of Business Research***, 56(6): 453–463.
Venkatraman, N. 1989. The concept of fit in strategy research: toward verbal and statistical correspondence. ***Academy of Management Review***, 14(3): 423–444.
Wagner, S. M., Coley, L. S., & Lindemann, E. 2011. Effects of suppliers' reputation on the future of buyer-supplier relationships: The mediating roles of outcome fairness and trust ***Journal of Supply Chain Management***, 47(2): 29–48.
Wan, W. P., & Yiu, D. W. 2009. From crisis to opportunity: Environmental jolt, corporate acquisitions, and firm performance. ***Strategic Management Journal***, 30(7): 791–801.
Wang, Q., Craighead, C. W., & Li, J. J. 2014. Justice served: Mitigating damaged trust stemming from supply chain disruptions. ***Journal of Operations Management***, 32(6): 374–386.
Wang, Q., Kayande, U., & Jap, S. 2010. The seeds of dissolution: Discrepancy and incoherence in buyer–supplier exchange. ***Marketing Science***, 29(6): 1109–1124.
Wayne, S. J., & Liden, R. C. 1995. Effects of Impression Management on Performance Ratings: A Longitudinal Study. ***The Academy of Management Journal***, 38(1): 232-260.
Weick, K. 1979. The Social Psychology of Organizing, 2nd edn McGraw-Hill. ***New York***.
Weick, K. E., & Roberts, K. H. 1993. Collective mind in organizations: Heedful interrelating on flight decks. ***Administrative Science Quarterly***: 357–381.
Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. 2005. Organizing and the Process of Sensemaking. ***Organization Science***, 16(4): 409-421.
Weiner, B. 1985. An attributional theory of achievement motivation and emotion. ***Psychological Review***, 92(4): 548–573.
Weiner, B. 1986. ***An attribution theory of motivation and emotion***. New York, USA: Springer-Verlag.
Weiner, B. 1995. ***Judgments of responsibility: A foundation for a theory of social conduct***. New York, NY: guilford Press.
Weiner, B. 2000. Attributional Thoughts about Consumer Behavior. ***Journal of Consumer Research***, 27(3): 382-387.
Wong, P. T., & Weiner, B. 1981. When people ask" why" questions, and the heuristics of attributional search. ***Journal of Personality and Social Psychology***, 40(4): 650.
Wooldridge, J. M. 2010. ***Econometric analysis of cross section and panel data***: MIT press.
World_Economic_Forum. 2013. Building Resilience in Supply Chains. World Economic Forum, Geneva,Switzerland.
Wu, Z., & Choi, T. Y. 2005. Supplier–supplier relationships in the buyer–supplier triad: building theories from eight case studies. ***Journal of Operations Management***, 24(1): 27–52.
Young-Ybarra, C., & Wiersema, M. 1999. Strategic flexibility in information technology alliances: The influence of transaction cost economics and social exchange theory. ***Organization Science***, 10(4): 439–459.
Zahra, S. A., & Filatotchev, I. 2004. Governance of the entrepreneurial threshold firm: A knowledge‐based perspective. ***Journal of Management Studies***, 41(5): 885–897.

Zhao, X., Huo, B., Flynn, B. B., & Yeung, J. H. Y. 2008. The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain. ***Journal of Operations Management***, 26(3): 368–388.

Zwick, R., & Mak, V. 2012. Gaming with fairness: Some conjectures on behavior in alternating offer bargaining experiments. ***Conflict Resolution Handbook***: 91–107.

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